

# FLOW CONTROL



**FLOW CONTROL CATALOGUE – TABLE OF CONTENTS**

Introduction.....	3
Baker Style Flow Control Equipment.....	5
Flow Control Equipment (Comparable to Otis®).....	7
Sliding Sleeves with Profiles.....	8
Sliding Sleeves without Profiles.....	9
Lock Mandrels for Sliding Sleeves.....	10
Separation Sleeves.....	11
Landing Nipples Top No-Go and Selective.....	12
Lock Mandrels Selective and Top No-Go Landing Nipples.....	13
Blanking Plugs By-Pass.....	14
Blanking Plugs Non-By Pass.....	15
Blanking Plugs Circulating.....	16
Check Valve Bottom Hole.....	17
Chokes Bottom Hole.....	19
Instrument Hangers Downhole.....	20
Landing Nipples Bottom No-Go.....	21
Locking Mandrel Bottom No-Go Landing Nipples.....	22
Blanking Plugs By-Pass.....	23
Blanking Plugs Non-By Pass.....	24
Instrument Hangers Downhole.....	25

## **INTRODUCTION**

The control of fluid flow in all types of wells, both within the tubing and tubing-to-casing, is a very important part of the operation of proper production, injection, and disposal techniques. Evolution Oil Tools Inc. offers a complete line of Landing Nipples and Sliding Sleeves which, along with their companion products, allow the operator a great deal of versatility in Sub-Surface Flow Control.

### **MODULAR DESIGN**

In almost every case, Evolution Flow Control Equipment designed to be run into Landing Nipples or Sliding Sleeves consists of two basic modules: The Lock Mandrel that secures the tool in place, and the Flow Control Module which performs the specific desired function. The interchangeability of the two basic components means that a variety of specifically-tailored products can be put together easily and quickly from a relatively small inventory of stock modules. The Flow Control product line offers the perfect marriage of versatility and economy.

### **POSITIVE LOCATION AND SELECTIVITY**

Being able to place a given Flow Control Device at a given spot in the tubing is only part of complete Sub-Surface Flow Control. Maximum service from a Flow Control System can only be realized when the locations for landing flow control devices are both numerous and sufficiently versatile to allow for changing the device at any time during the life of the well.

The design of Evolution Landing Nipples and Sliding Sleeves, and the variety and interchangeability of the companion retrievable products that landing them, give true meaning to the phrase "POSITIVE LOCATION AND SELECTIVITY. In an Evolution equipped well, the selection of a landing location for a flow control device is not limited by the number of landing locations a tool must pass through while running in the hole.

### **LANDING NIPPLE – SELECTIVE (OR TOP NO-GO)**

One or more Selective or Top No-Go Landing Nipples may be installed in the production tubing at various intervals. Once installed these nipples act as receptacles for many flow control devices. Some examples of the more common uses of Selective or Top-No Go Landing Nipples are:

- Blanking Plug to shut off flow or to allow for tubing testing.
- Bottom Hole Choke to control hydrate formation.
- Instrument Hanger for gathering reservoir information.
- Bottom Hole Check Valves to control fluid fall-back.

Depending on the style of Landing Nipples used, care must be taken to ensure size compatibility of the complete Flow Control System. This is described more fully in the following pages.

### **LANDING NIPPLE – BOTTOM NO-GO**

One Bottom No-Go Landing Nipple may be installed at the bottom of the production tubing. Once installed this nipple acts as a receptacle for many Flow Control Devices. Some examples of the more common uses of Bottom No-Go Landing Nipples are:

- Blanking Plug to shut off flow or to allow for tubing testing.
- Bottom Hole Choke to control hydrate formation.
- Instrument Hanger for gathering reservoir information.
- Bottom Hole Check Valves to control fluid fall-back.

### **SLIDING SLEEVE**

One or more Sliding Sleeves may be installed in the production tubing to allow for repeated, reliable tubing-to-casing communication. The primary function for the Sliding Sleeve is to provide for this communication. However, most sleeves are designed to also accept the same range of Flow Control Devices (although configured differently) as both Selective and Bottom No-Go Landing Nipples.

The common uses for Sliding Sleeves are:

- Allow multi-zone production up one tubing string.
- Allow selective zone stimulation or testing.
- Allow circulation to kill the well or displace fluids.

## **BAKER STYLE FLOW CONTROL EQUIPMENT**

### **Landing Nipples**

The basic landing nipple in the Baker-Style Flow Control Equipment product line is the Model “EF” Landing Nipple. The “EF” Landing Nipple profile is also machined into the upper sub of the Model “EL” Sliding Sleeve. In the case of both the Model “EF” Landing Nipple and the upper sub of the Model “EF” Sliding Sleeve, the same styles of Lock Mandrel Modules can be used.

The other commonly used Landing Nipple in this product line is the Model “ER” Bottom No-Go Landing Nipple. Because of its use of a restricted bottom No-Go ID, only bottom No-Go Lock Mandrel Modules may be used with it.

### **NO-GO BASE**

Depending on the model of the equipment being used, either an enlarged Ni-Go OD or reduced No-Go ID is used to;

- Provide a means to positively locate the Flow Control device.
- Prevent any further downward movement of the Flow Control device.

It is important to remember that the minimum ID through Model “ER” Bottom No-Go Landing Nipples is represented by the ID through the No-Go; not by the seal bore ID.

In the case of a Top No-Go Flow Control device, the Lock Mandrel Module has an enlarged No-Go “OD” which locates at the top of the seal bore.

In the case of a Bottom No-Go Flow Control device a No-Go shoulder on the tool locates on the restricted No-Go “ID” at the bottom of the Model “ER” Landing Nipple.

In the case of a Selective Flow Control device there are two running-in options. When the tool is run without any positive location method, the upward facing locking dogs are used to position the tool. If the situation allow, the Model “EC-1” Running Tool can be dressed with a positive location device to allow for positive location of the selective tool.

### **LOCK MANDREL MODULES**

Model “ES” and “EW” Lock Mandrel Modules are used in Model “EF” Landing Nipples and Model “EL” Sliding Sleeves. Model “EZ” Lock Mandrel Modules are used in Model “ER” Landing Nipples.

### **SLIDING SLEEVES**

The Model “EL” Sliding Sleeve is the most common sleeve in this product line. It is comprised of an upper sub which has a built in “EF” Landing Nipple profile, a lower sub, an outer housing and an inner sleeve.

The Model “EL” Sliding Sleeve has several features:

- Positive Control – the design of the Model “ED-2” Shifting Tool ensures that the wireline operator has a positive indication that the sleeve is fully shifted open or closed.
- Seals – the lower bonded seals on the inner sleeve are designed to be successfully and reliably shifted open and closed many times.
- Protected Inner Sleeve – the inner sleeve is recessed to protect it from accidentally shifting while running other Flow Control devices through it.
- Multiple Sleeves – can be run in the well as required without any loss of function.

### **PRODUCT IDENTIFICATION**

Because of the modular nature of the Evolution Flow Control Product Line, the identification of the tools within the product line is quite simple. Any tool designed to be run into a Landing Nipple or Sliding Sleeve is described by means of a four letter identification. The first letter (an E) refers to Evolution as the manufacturer. The second letter refers to the receptacle the tool is to be run into. The third identifies the Lock Mandrel Module used to make up the tool, and the fourth letter refers to the type of Flow Control accessory bottom used.

Two examples of Product Identification are listed below.

#### **Model “ERZG” Bypass Blanking Plug:**

E for Evolution as manufacturer  
Model “ER” Landing Nipple (receptacle)  
Model “EZ” Lock Mandrel Module (lock mandrel module)  
Model “EG” Bottom (Flow Control accessory bottom)

#### **Model “ELSE” Separation Sleeve:**

E for Evolution as manufacturer  
Model “EL” Sliding Sleeve (receptacle)  
Model “ES” Lock Mandrel Module (lock mandrel module)  
Model “EE” Bottom (Flow Control accessory bottom)

**FLOW CONTROL EQUIPMENT  
(Comparable to OTIS®)****LANDING NIPPLES**

The basic landing nipple in Evolution Flow Control Equipment product line, comparable to OTIS®, is the Model SLX Landing Nipple. The SLX Landing Nipple profile is also machined into the upper sub of the Model SLXA Sliding Sleeve. In the case of both the Model SLXA Sliding Sleeve, the same styles of Lock Mandrel Modules can be used.

The other commonly used Landing Nipple in this product line is the Model SLXN Bottom No-Go Landing Nipple. Because of its use of a restricted bottom No-Go ID, only bottom No-Go Lock Mandrel Modules may be used with it.

**LOCK MANDREL MODULES**

Model SLX Lock Mandrel Modules are used in Model SLX Landing Nipples and Model SLXA Sliding Sleeves. Model SLXN Lock Mandrel Modules are used in Model SLXN Landing Nipples.

**POSITIVE LOCATION**

Because of the design of the Models SLX and SLXN Lock Mandrel Modules, all flow control devices run using either of these types of lock mandrels can be positively located.

The Model SLX Running Tool is used to run both lock mandrels. The Model SLX Lock Mandrel is run selectively. When the proper running procedure is employed, the model SLX Lock Mandrel can be run through many Model SLX Landing Nipples and set in any desired location.

The Model SLXN Lock Mandrel Module is a bottom No-Go mandrel. It positively locates on the restricted ID of the No-Go shoulder of the Model SLXN Landing Nipple.

**PRODUCT IDENTIFICATION**

Because of the modular nature of this part of the Evolution Flow Control product line, the identification of the tools within the product line is quite simple. Any tool designed to be run into a Landing Nipple or Sliding Sleeve is described by means of four or five letter identification. The first two letters (SL) refer to Evolution as the manufacturer. The third letter refers to the flow control accessory bottom used. The fourth and fifth letters identify the Lock Mandrel Module used to make up the tool. When a Model SLX Lock Mandrel is used the product identification has only four letters. There are five letters in any product identification of a product using a Model SLXN Mandrel.

Two examples of Product Identification are listed below.

**Model "SLPX" Bypass Blanking Plug:**

SL for Evolution as manufacturer  
Model P Bottom (flow control accessory bottom)  
Model "SLX" Lock Mandrel Module (lock mandrel module)

**Model "SLXX" Separation Sleeve:**

SL for Evolution as manufacturer  
Model "X" Bottom (flow control accessory bottom)  
Model "SLX" Lock Mandrel (lock Mandrel module)

OTIS® is the registered trademark of Halliburton Energy Services Inc.

**SLIDING SLEEVES  
WITH PROFILES****Model "EL"****Model "SLXA"**

**The Models "EL" and "SLXA" Sliding Sleeves** are sub-surface flow control devices. They are primarily intended to control flow between the tubing and the casing.

Both sleeves contain an inner sleeve which can be shifted open and closed repeatedly. Both also have a landing nipple profile machined into the upper sub to allow flow control devices to be landed there when necessary.

**The Model "EL" and "SLXA" Sliding Sleeves** are manufactured in both sweet and sour service versions. They are both available in a wide variety of materials and thread combinations.

**Applications:**

- Displacing kill or completion fluid.
- Allowing multiple zones to produce up one tubing string.
- Selective testing of individual zones.
- Selective stimulation of individual zones.
- Circulating to kill the well.
- Gas lifting the well.
- Landing a blanking plug in the profile in the upper sub to shut in the well, test the tubing, or test the sleeve itself.
- Circulating inhibitors or methanol.



### SLIDING SLEEVES WITHOUT PROFILES



Model "EZ"



Model "SLA"

Like the "EL" and "SLXA" Sliding Sleeves, the "EZ" and "SLA" Sliding Sleeves have a housing, inner sleeve, upper and lower sub. However, they do not have a landing nipple profile built into the upper sub, nor do they have a seal bore in either the upper or lower sub. This means that the "EZ" and "SLA" Sliding Sleeves can be used in cases where economy and/or minimum tubing restriction is a primary concern for the operator. They still have all of the basic operational features and reliability of the premium sliding sleeves in the product line, without the capabilities of accommodating the accessory tools.

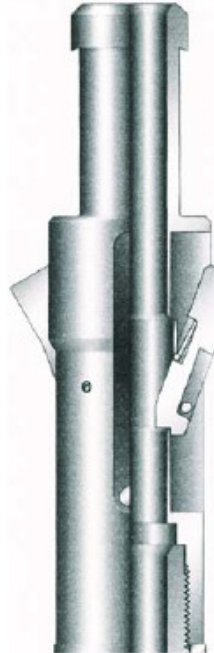
#### APPLICATIONS:

- Displacing kill or completion fluid.
- For use in multi-zone completions.
- Circulating kill fluid.
- Circulating inhibitors or methanol.
- Gas lifting the well.

**LOCK MANDRELS  
FOR SLIDING SLEEVES**



Model "ES"



Model "EW"



Model "SLX"

**The Model "ES" Lock Mandrel** has two up-facing and two down-facing locking dogs to prevent both upward and downward movement.

It has no No-Go intrinsic to the lock mandrel itself. It has an external fishing neck.

**The Model "EW" Lock Mandrel** has two up-facing locking dogs to prevent upward movement and a No-Go shoulder to prevent downward movement. It has an external fishing neck.

**The Model "SLX" Lock Mandrel** has two locking dogs to prevent both upward and downward movement. It has no No-Go intrinsic to the lock mandrel itself. It has an internal fishing neck.

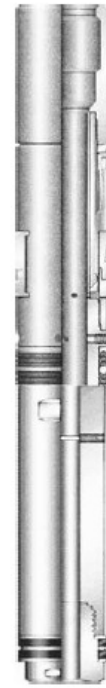
**SEPARATION SLEEVES**



Model "ELSE"



Model "ELWE"



Model "SLXX"

**FEATURES:**

- Straddles and packs off above and below the flow ports.
- Allows flow from lower zone up the middle of the tool.
- Pressure is equalized by breaking the equalization plug.

**APPLICATIONS:**

- To blank off the ports in the sliding sleeve.
- To shut off flow from the casing zone.
- To allow flow from a lower zone.

**LANDING NIPPLES  
TOP NO GO AND SELECTIVE**



**Model "EF"**



**Model "SLX"**

**The Models "EF" and "SLX" Landing Nipples** are top No-Go or selective landing nipples which provide for the location of various wireline-run and retrieved Flow Control devices in the production tubing string.

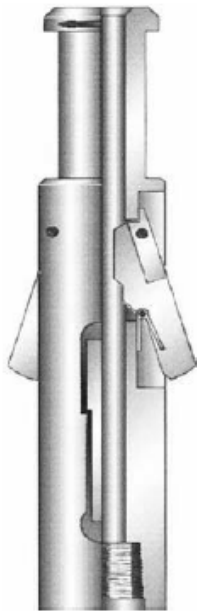
The location and number of **Model "EF" or "SLX" Landing Nipples** should be carefully considered before the well is completed to assure that maximum versatility and flexibility are obtained.

**The Model "EF" and "SLX" Landing Nipples** are manufactured to **NACE Mr-01-75**. Both are available in a wide variety of materials and thread combinations.

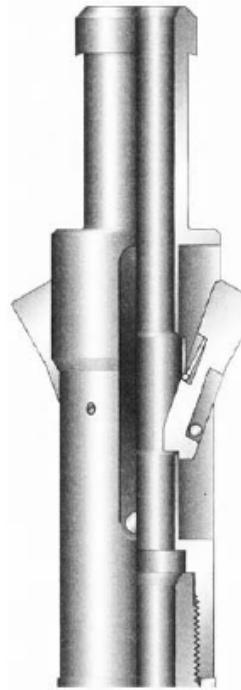
**APPLICATIONS:**

- Land blanking plugs to test tubing.
- Land blanking plugs to shut in well.
- Land bottom hole chokes.
- Land circulating blanking plugs.
- Land bottom hole check valves.
- Land instrument hangers.
- Land other flow control devices.

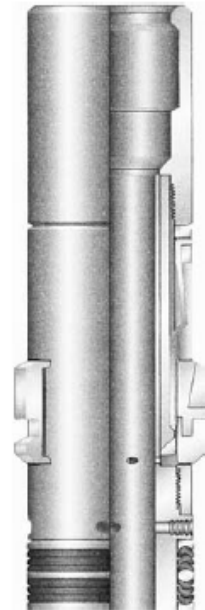
**LOCK MANDRELS  
SELECTIVE AND TOP NO-GO  
LANDING NIPPLES**



Model "ES"



Model "EW"



Model "SLX"

**The Model "ES" Lock Mandrel** has two up-facing and two down-facing locking dogs to prevent both upward and downward movement. It has no No-Go intrinsic to the lock mandrel itself. It has an external fishing neck.

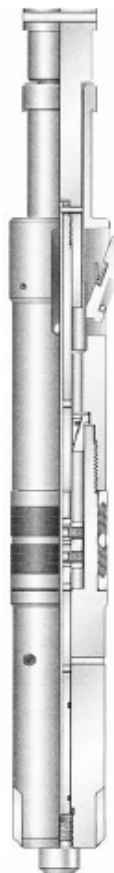
**The Model "EW" Lock Mandrel** has two up-facing locking dogs to prevent upward movement and a No-Go shoulder to prevent downward movement. It has an external fishing neck.

**The Model "SLX" Lock Mandrel** has two locking dogs to prevent both upward and downward movement. It has no No-Go intrinsic to the lock mandrel itself. It has an internal fishing neck.

**BLANKING PLUGS  
BY-PASS**



Model "EFSG"



Model "EFWG"



Model "SLPX"

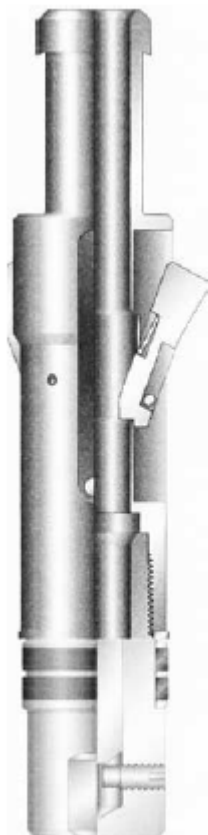
**FEATURES:**

- The plugs are run in the by-pass position, assuring equalization.
- To equalize pressure the prong must be pulled from the plug body.
- Normal wireline tools and techniques are used to run and pull.

**APPLICATIONS:**

- To shut in the well downhole.
- To snub tubing in and out of the hole.
- To set hydraulic packers.
- To test tubing by bleeding pressure off from above.

**BLANKING PLUGS  
NON-BY-PASS**



**Model "EFPW"**

**FEATURES:**

- Holds pressure from both directions.
- To equalize pressure the equalizing plug must be broken.
- It is a very simple, rugged plug.

**APPLICATIONS:**

- To shut in the well downhole.
- To snub tubing in and out of the hole.
- To set hydraulic packers.
- To test tubing by bleeding pressure off from above.

**NOTE:** Because this plug has no bypass mechanism, it cannot be run on any lock mandrel which must be run through and then back up into the nipple. It cannot be run on a Model "ES" or "SLX" Lock Mandrel.

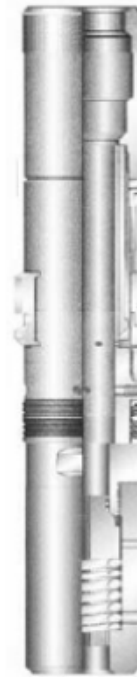
**BLANKING PLUGS  
CIRCULATING**



Model "EFSB"



Model "EFWB"



Model "SLCX"

**FEATURES:**

- Holds pressure from below but allows circulation from above.
- Has a built-in equalization mechanism.
- Can be held off seat to allow bypass while running in.

**APPLICATIONS:**

- To shut in the well downhole.
- To snub tubing in and out of the hole.
- To kill the well by circulating down through it.
- To test tubing by bleeding pressure off from above.
- To equalize pressure above and below by pumping down through.



**CHECK VALVE  
BOTTOM HOLE**



**Model "EFW"**

**FEATURES:**

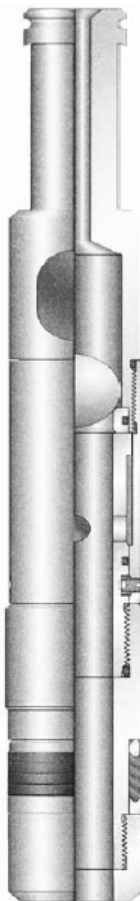
- Holds pressure from above but allows flow from below.
- To equalize pressure the equalizing plug must be broken.

**APPLICATIONS:**

- To prevent fluid fall back in plunger lift wells.
- To set hydraulic packers.
- To test tubing by pressuring from above.

**NOTE:** Because this check valve has no by-pass mechanism, it cannot be run on any lock mandrel which must be run through and then back up into the nipple. It cannot be run on a **Model "ES" or "SLX" Lock Mandrel.**

**CHECK VALVE  
BOTTOM HOLE**



Model "EFB-2"

**FEATURES:**

- Holds pressure from above but allows flow from below.
- It has a No-Go shoulder to prevent downward movement.
- It is landed in standard landing nipples or sliding sleeve upper subs.
- To equalize pressure the equalizing ports are shifted open.

**APPLICATIONS:**

- To prevent fluid fall back in plunger lift wells.
- To set hydraulic packers.
- To test tubing by pressuring from above.

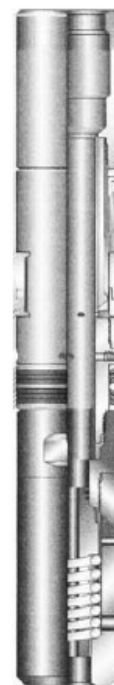
**CHOKES  
BOTTOM HOLE**



Model "EFST"



Model "EFWT"



Model "SLAX"

**FEATURES:**

- Restricts fluid flow up the tubing string.
- Allows circulation from above if necessary.
- Available in a wide variety of orifice sizes and materials.

**APPLICATIONS:**

- To eliminate hydrate formation.
- To reduce or eliminate paraffin formation.
- To prevent water and sand encroachment.
- To reduce GOR by keeping back pressure on the formation.
- To control daily production rates.
- To reduce surface flowing pressures.

**INSTRUMENT HANGERS  
DOWNHOLE**



Model "EFSB"



Model "EFWB"



Model "SLBX"

**FEATURES:**

- Recording instruments can stay in the hole for extended periods.
- Flowing tests can be conducted safely through the tool.
- Several wells may be surveyed with only one wireline unit.

**APPLICATIONS:**

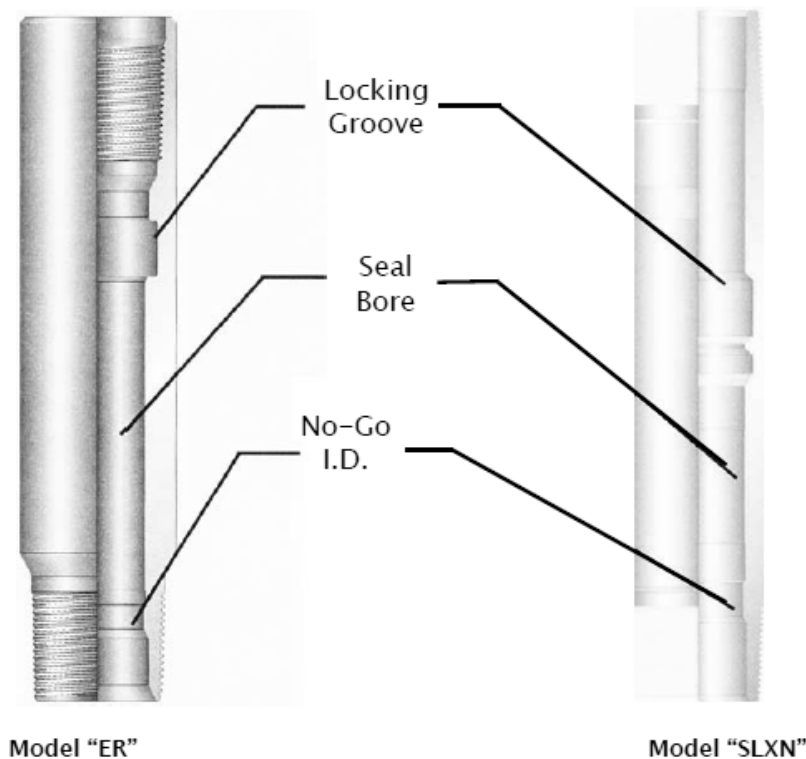
- To securely lock pressure/temperature recorders in place.

## LANDING NIPPLES BOTTOM NO-GO

The **Models ER and SLXN Landing Nipples** are bottom No-Go landing nipples which provide for the location of various wireline-run and retrieved Flow Control devices in the production tubing string.

Because of the restricted ID represented by the bottom No-Go ID, care should always be taken in the placement of these nipples. Normally only one bottom No-Go nipple is run in the production tubing string.

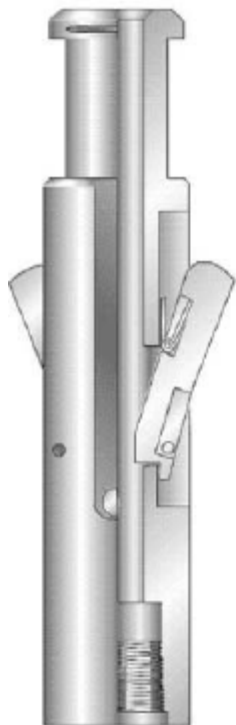
The **Model ER and SLXN Landing Nipples** are manufactured to **NACE Mr-01-75**. Both are available in a wide variety of materials and thread combinations.



### APPLICATIONS:

- Land blanking plugs to test tubing.
- Land blanking plugs to shut in well.
- Land bottom hole chokes.
- Land circulating blanking plugs.
- Land ERGO Flapper Valves.
- Land bottom hole check valves.
- Land instrument hangers.
- Land other flow control devices.

**LOCKING MANDRELS BOTTOM  
NO-GO LANDING NIPPLES**



Model "EZ"



Model "SLXN"

**The Model EZ Lock Mandrel** has two up-facing locking dogs to prevent upward movement. It uses a No-Go shoulder on the Flow Control device to prevent downward movement. It has an external fishing neck.

**The Model SLXN Lock Mandrel** has two locking dogs to prevent both upward and downward movement. It has no No-Go intrinsic to the lock mandrel itself. It has an internal fishing neck.

**BLANKING PLUGS  
BY-PASS**



Model "ERZG"



Model "SLPXN"

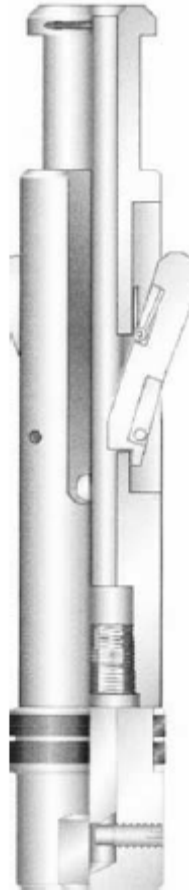
**FEATURES:**

- The plugs are run in the by-pass position, assuring equalization.
- To equalize pressure the prong must be pulled from the plug body.
- Normal wireline tools and techniques are used to run non-by-pass Blanking Plugs.

**APPLICATIONS:**

- To shut in the well downhole.
- To snub tubing in and out of the hole.
- To set hydraulic packers.
- To test tubing by bleeding pressure off from above.

**BLANKING PLUGS  
NON-BY PASS**



**Model "ERZP"**

**FEATURES:**

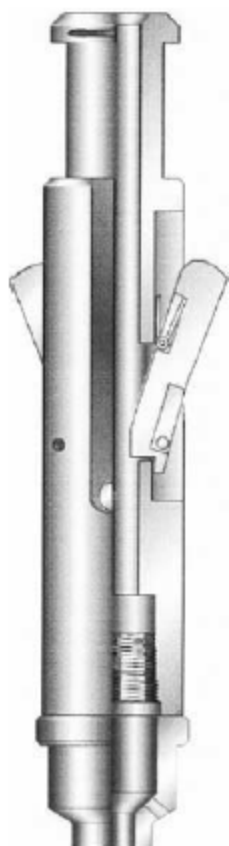
- Holds pressure from both directions.
- To equalize pressure the equalizing plug must be broken.
- It is a very simple, rugged plug.

**APPLICATIONS:**

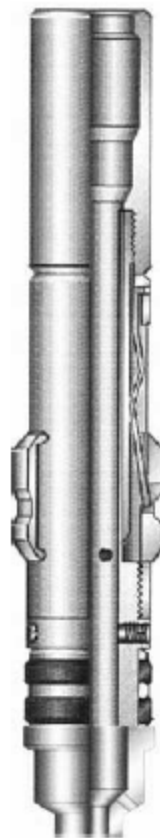
- To shut in the well down hole.
- To snub tubing in and out of the hole.
- To set hydraulic packers.
- To test tubing by bleeding pressure off from above.



**INSTRUMENT HANGERS  
DOWNHOLE**



Model "ERZB"



Model "SLBXN"

**FEATURES:**

- Recording instruments can stay in the hole for extended periods.
- Flowing tests can be conducted safely through the tool.
- Several wells may be surveyed with only one wireline unit.

**APPLICATIONS:**

- To securely lock pressure/temperature recorders in place.