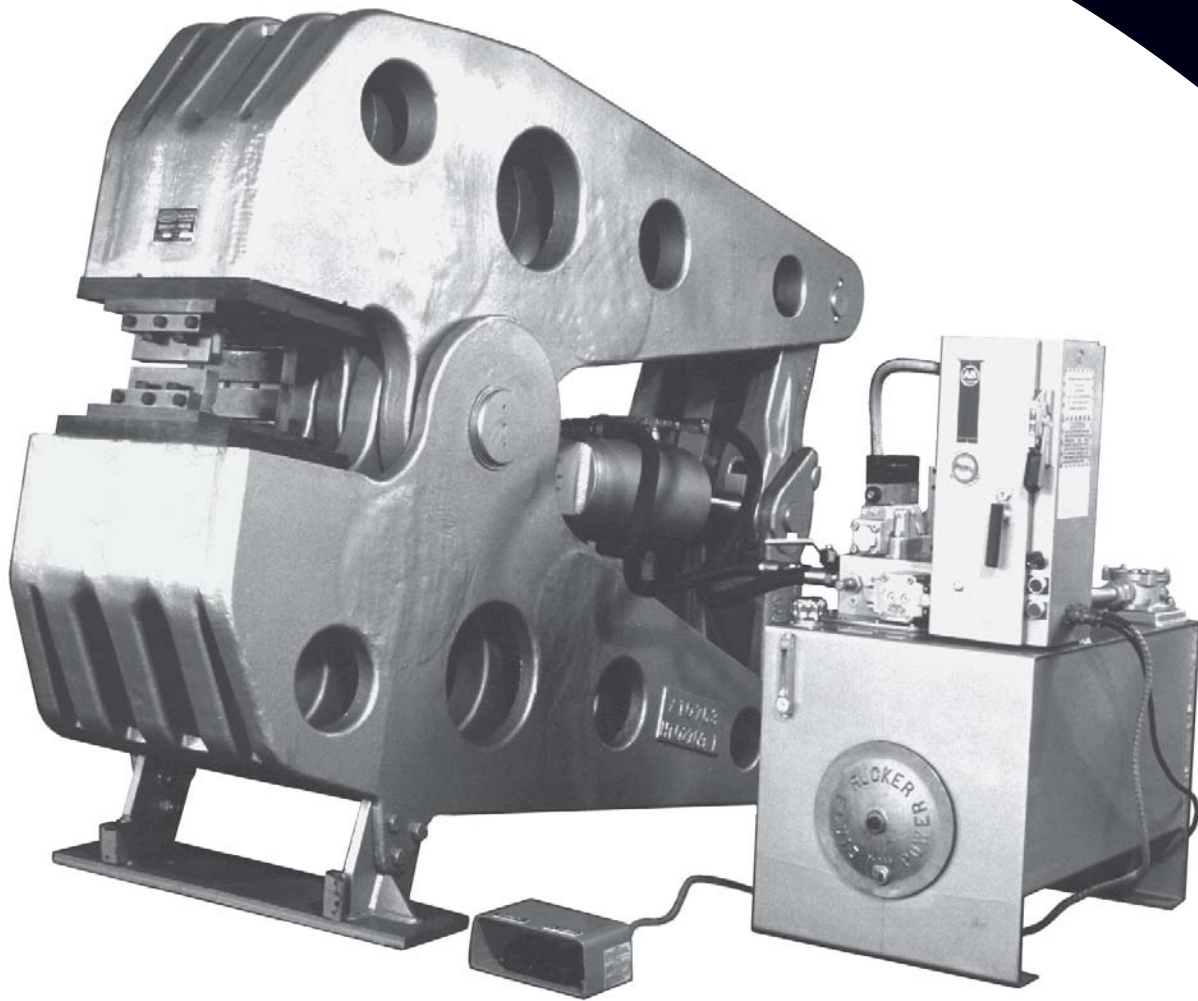


# Industrial Castings Product Catalog

ESCO® Swaging Instructions

I-RIG-500-0704



 **ESCO®**  
*Engineered Products*



## Table of Contents

Introduction .....	4
Definitions .....	5
Safety Procedures .....	6
The ESCO® Swaging System: A 4-Step Approach .....	7
ESCO Swaging Dies .....	8
How to Swage ESCO Stainless Steel One-Piece Duplex Eyes .....	9
How to Swage ESCO Stainless Steel Two-Piece Duplex Eyes .....	12
Tips for Making Flemish Eyes .....	14
How to Swage ESCO Stainless Steel Single Sleeves for Flemish Eyes .....	16
How to Swage ESCO Carbon Steel Single Sleeves for Flemish Eyes .....	19
How to Swage ESCO Cast Stainless Steel Open and Closed Sockets/5/16"-1-1/8" .....	22
How to Swage ESCO Cast Stainless Steel Open and Closed Sockets/1/4"-1-1/4" .....	25
How to Swage ESCO Cast Stainless Steel Open and Closed Sockets/1-1/4"-2" .....	28
How to Swage ESCO Choker Ferrules .....	30
How to Swage ESCO Drumline and End Ferrules .....	34
How to Swage ESCO Swage Die Wear Gauges .....	37
How to Swage ESCO Swagers and Accessories .....	39

*Please read this manual carefully and completely.*

## Introduction

This instruction manual contains the proper swaging instructions for swaging ESCO® swage fittings in ESCO dies using ESCO Mark Series swagers. Carefully follow these instructions to help you work safely and provide for the best possible efficiency in your swaged assemblies.

These instructions are appropriate for Mark Series swagers in good condition that are operating at designed pressures. Older model swagers with mechanical or hydraulic wear may require special swaging operations or corrective maintenance work.

Every swager operator should consult this manual on a regular basis and should adhere closely to the step-by-step swaging procedures.

For the correct installation, maintenance, and operation of the swager, refer to your *ESCO Mark Series Swager Operator's Manual*.

**Rigging Products Division**  
**ESCO CORPORATION**

### **Technical & Sales Support**

If you require any assistance, or you need to order parts, please contact your ESCO representative or call our toll free number 1-800-227-3726 or fax to 1-800-344-8635 (USA and Canada).

## Definitions

### Design Factor

**Design Factor** is an industry term that denotes the theoretical reserve capability of a product, usually computed by dividing the Ultimate Load by the Working Load. Design Factor is generally expressed as a ratio (such as 5 to 1 or 5:1).

### Duplex

**Duplex** refers to swage sleeves intended for use with double-back, fold back, returned loops, or turn back eyes formed by laying the wire rope back on itself to form a loop.

### Ferrules

A **ferrule** is a fitting used to form a holding point on a piece of wire rope. Ferrules are also called stops, buttons, knobs or end fittings. Ferrules are designed to fit one part of wire rope and may be applied with zinc, wedges, or by swaging.

***Important:** A statement preceded by the word **IMPORTANT** is one that possesses special significance.*

***Note:** This is information that is handy to know and may make your job easier.*

### Proof Load

**Proof load** is the average force applied when performing a proof test (the average force to which a product may be subjected before deformation occurs). Proof load is usually twice the Working Load Limit.

### Ratings

All ratings given refer to short tons of 2,000 pounds unless otherwise noted.

### Shock Load

**Shock load** is a force that results from a rapid application of a load (such as impacting or jerking) or the rapid movement of a static load. Shock loads add significantly to the static load and should be avoided.

### Single

**Single** refers to swage sleeves intended for use with rolled, Farmer's, or Flemish eyes formed by unlaying the strands and relaying the strands around themselves to form a loop.

### Sleeves

**Sleeves** are fittings used to form eyes or loop terminations at the end of a piece of wire rope. They are designed to contain two parts of the wire rope at the base of the eye or loop to hold the eye or loop in place.

### Sockets

A loop, clevis, or pin eye terminal attached at the end of a piece of wire rope is called a socket. Sockets are designed to fit one part of wire rope and may be applied with socketing media, wedges, or by swaging.

### Ultimate Load

**Ultimate load** is the average load at which the product fails and no longer supports the load.

***▲ Warning:** A statement preceded by the triangular attention symbol followed by the word **WARNING** contains information that must be acted upon to avoid serious injury or death.*

### Wire Rope

**Wire rope** refers to new 6 x 19, or 6 x 37 Class, EIP, IWRC, right regular lay wire rope made to U.S. specifications.

### Working Load Limit (WLL)

The maximum mass or force that a new or as-new product is ever authorized to support in service when the pull is uniformly applied in line with the center line of the product.

## Safety Procedures

**▲ WARNING:** *Misuse of ESCO® swagers can result in serious injury or death.*

1. When operating ESCO swagers always wear appropriate personal safety equipment:
  - A. Safety glasses
  - B. Safety shoes
  - C. Gloves
  - D. Hard hat
2. When swaging fittings in an ESCO swager, refer to *ESCO I/RIG 500 Swaging Instructions Manual* for proper information on the swaging of fittings and the dies that are to be used.
3. Observe die closure from above and to the side. Do not look directly into the die area during swaging. It is recommended that the operator stand 45° at either side of the swager.
4. Position swager so that toggle linkage is clear of other equipment and free to cycle through the full range of motion.
5. Disconnect the electrical power before working on any electrical or hydraulic component.
6. Do not use the swager to try to form steel plate, bar stock, or anything other than designed swage fittings.
7. Keep foot controls clear and unobstructed.
8. Exercise care in handling greasy dies to avoid dropping them.
9. Keep die base plates, dies, and swager platen area clean to reduce the possibility of die failure.
10. Allow sufficient rope handling room around the swager area so that operation is unobstructed and straightforward.
11. Always operate the swager at the correct hydraulic pressure. Never set the pressure so that the swaging force is greater than the WLL of the dies in use. Refer to the specific operators manual for the correct hydraulic pressure.
12. Do not increase hydraulic pressure above factory settings on ESCO Mark Series swagers without checking with a factory technician.

# The ESCO® Swaging System: A 4-Step Approach

## Step 1- Wire Rope

ESCO swage fittings are designed for use on 6 x 19 classifications, right regular lay, EIP, IWRC wire ropes manufactured to U.S. specifications. If other constructions of wire rope are to be used, sample assemblies should be swaged and properly tested.

## Step 2- Fittings

Design the rigging for the job. Always select the correct rope size and the correct fitting type and size to meet the requirements of the specific applications.

## Step 3- Dies

To assure maximum efficiency, the fittings must be swaged in the correct die size as specified on page 8. Be sure to check dies periodically for wear using ESCO swaging/no-go gauges.

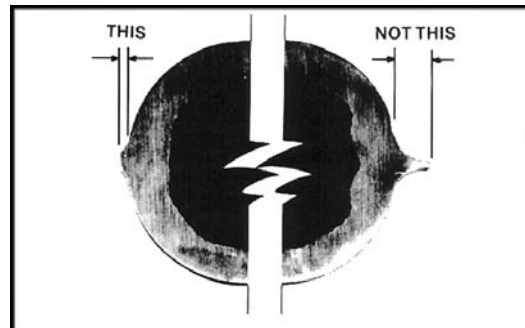
**Note:** Clean dies and die area before swaging. Grit and dirt will accelerate wear and can cause die breakage. Use E.P. No. 1 or No. 2 extreme pressure grease to lubricate the dies or fittings before swaging.

## Step 4- Swaging

Follow the procedures in this instruction manual carefully. To assure maximum gripping strength of the swage fittings, the dies must close fully on the final swaging.

**IMPORTANT:** Do not allow sharp flashing to form. If excessive flash starts to form, do not close dies fully. Work the fitting in subsequent swagings until the dies can be closed fully. Rotate the fitting 45° (1/8 turn) for the second swaging. Do not position the flash in the bottom of the die channel.

**Note:** ESCO stainless steel fittings work-harden when swaged. Follow the instructions carefully.



Flash should be a slight bump like the left side of the illustration, not sharp like the right side of the illustration.

# ESCO® Swaging Dies



Open channel dies



Tapering dies



Ferrule dies



Forged socket dies

## Die Diameters

Following is a listing of nominal diameters for dies used to swage standard ESCO fittings. Die selector charts are available from your ESCO representative. If you are swaging nonESCO fittings, be sure to contact the fitting manufacturer to determine proper diameters and swaging techniques.

**IMPORTANT:** Through normal usage, swaging dies are subject to "wear". ESCO has available die wear gauges which should be used to determine when a die should be replaced. See page 37 of this manual for instructions on the use of these gauges. Dies that exceed maximum die diameter should be replaced.

Die Description	Part Number				Die Description	Part Number			
	Mark 75/87	Mark 100 & Larger	Max. Die Diameter	Max. Swager Diameter		Mark 100 & 150	Mark 200 & 250	Max. Die Diameter	Max. Swager Diameter
<b>OPEN CHANNEL DIES</b>									
1/8" Open Channel	4016518	4003337	0.2545	0.258	7/8" Open Channel	4091003	4003344	1.7545	1.760
3/16" Open Channel	4016519	4003337	0.3795	0.383	1" Open Channel	4003345		2.0305	2.036
1/4" Open Channel	4016520	4003338	0.5241	0.528	1-1/8" Open Channel	4003346		2.2545	2.260
5/16" Open Channel	4016521	4003339	0.6295	0.634	1-1/4" Open Channel	4003347		2.5045	2.511
3/8" Open Channel	4016520	4003338	0.7545	0.759	1-1/2" Open Channel	4003348		2.692	2.698
7/16" Open Channel	4016519	4003339	0.8795	0.884	1-1/2" Open 1st. Stg.	4006473		3.010	3.016
1/2" Open Channel	4016518	4003340	1.0045	1.009	1-3/4" Open Channel		4048572	3.074	3.080
9/16" Open Channel	4097396	4003341	1.1295	1.134	2" Open Channel		4048598	3.512	3.519
5/8" Open Channel	4016522	4003342	1.2685	1.273	2-1/4" Open Channel		4048599	4.012	4.019
3/4" Open Channel	4016523	4003343	1.5245	1.530	2-1/2" Open Channel		4048600	4.387	4.394
<b>TAPERING DIES</b>									
1/4" (2 Channel)	4089196	4089194	0.561	0.565	1-3/8" Taper	4003357		2.511	2.517
3/8" Taper	4079211	4089195	0.761	0.765	1-1/2" Taper	4003358		2.667	2.673
3/8" Taper	4079211		0.761	0.765	1-3/4" Open 1st. Stage		4048598	3.512	3.519
1/2" Taper	4016224	4003350	1.011	1.015	1-3/4" Taper 2nd Stage		4070864	3.074	3.080
5/8" Taper	4016225	4003351	1.229	1.233	2" Open 1st Stage		4048599	4.012	4.019
3/4" Taper	4016226	4003352	1.448	1.452	2" Open 2nd Stage		4048598	3.512	3.518
7/8" Taper		4003353	1.698	1.703	2-1/4" Open 1st. Stage		4070865	4.451	4.458
1" Taper		4003354	1.886	1.891	2-1/4" Open 2nd. Stage		4048599	4.012	4.019
1-1/8" Taper		4003355	2.091	2.096	2-1/2" Open 1st. Stage		4070866	4.826	4.834
1-1/4" Taper		4003356	2.292	2.297	2-1/2" Open 2nd Stage		4070865	4.451	4.458
<b>FORGED SOCKET DIES</b>									
1/4" Forged Socket	4005874	4005864	0.4425	0.446	1-1/8" Forged Socket	4005870*		2.0075	2.013
3/8" Forged Socket	4005874	4005864	0.6925	0.697	1-1/4" Forged Socket		4003254	2.2575	2.263
1/2" Forged Socket	4005876	4005865	0.8795	0.884	1-3/8" Forged Socket		4003255	2.5075	2.514
5/8" Forged Socket	4005877	4005866	1.1295	1.134	1-1/2" Forged Socket		4003256	2.758	2.764
3/4" Forged Socket		4005867	1.3795	1.384	1-3/4" Forged Socket		4003257	3.008	3.014
7/8" Forged Socket		4005868	1.5065	1.512	2" Forged Socket		4003258	3.508	3.515
1" Forged Socket		4005869	1.7565	1.762					
<b>FERRULE DIES</b>									
Midget Side Entry	4069623	4069624	1.071	1.076	Bantam Side Entry	4069626		1.601	1.606
Midget Front Entry	4016782	4016528	1.071	1.076	Bantam Front Entry	4016532		1.601	1.606
Dwarf Side Entry		4069625	1.445	1.449	Light Side Entry	4069627	4052904	(fr) 2.031	2.036
Dwarf Front Entry		4016530	1.445	1.449	Junior Side Entry	4069628		2.257	2.262

**Note:** Swaging diameter is for reference only.

\*MK 150 only

# How to Swage ESCO® Stainless Steel One-Piece Duplex Sleeves

## Fast Swaging Service

ESCO stainless steel has the strength, durability, and ability to work-harden. It also allows you to splice wire rope without a conventional rolled eye.

ESCO one-piece stainless steel duplex sleeves provide the quickest, simplest way to make swaged eye assemblies. Even difficult jobs, such as making very small eyes and tight thimble eyes, can be easily accomplished.

These sleeves are designed to be used on 6 x 19 classification, right regular lay, E.I.P., I.W.R.C. wire rope manufactured to U.S. specifications. If other constructions of wire rope are to be used with these swage fittings, sample assemblies should first be made and properly tested.

## Check Dies for Wear

Before swaging, check your dies with ESCO die gauges to be certain they are in good condition.

## Lubricate Dies

Use E.P. No. 1 or No. 2 Extreme Pressure Grease to lubricate dies or sleeves before swaging.

## Die Selection

Use the chart below to select the correct dies:

ESCO Stainless Steel 2 PC. Duplex Sleeves			
Sleeve (Rope) Size	Die Description*	Die Part Number	
		Mark 75/87 Swagers	Mark 100 & Larger Swagers
1/8"	1/8" Open Channel	4016518	4003337
3/16"	3/16" Open Channel	4016519	4003337
1/4"	1/4" Open Channel	4016520	4003338
5/16"	3/8" Open Channel	4016520	4003338
3/8"	3/8" Open Channel	4016520	4003338
7/16"	1/2" Open Channel	4016518	4003340
1/2"	1/2" Open Channel	4016518	4003340
9/16"	5/8" Open Channel	4016522	4003342
5/8"	5/8" Open Channel	4016522	4003342
3/4"	3/4" Open Channel	4016523	4003343
7/8"	7/8" Open Channel	4091003	4003344
<b>NOTE:</b> 7/8" is maximum size for Mark 87 swager			
1"	1" Open Channel		4003345
<b>NOTE:</b> For larger ropes use 2-Pc. Duplex Sleeves			

**⚠ Warning:** When using 2-1/2" x 5" dies in Mark 200 or Mark 250 swagers, always adjust the hydraulic relief pressure to 1300 psi maximum (Mark 200) 1150 psi maximum (Mark 250).

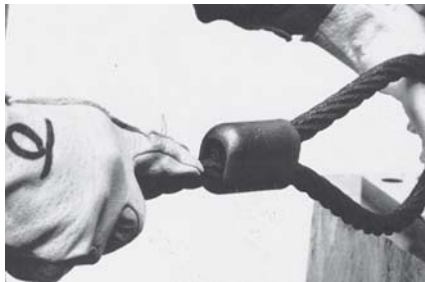
# How to Swage ESCO® Stainless Steel One-Piece Duplex Sleeves



## Step 1

Slip the sleeve on the rope and insert rope end into sleeve.

**IMPORTANT:** Make sure you use the right size of wire rope, the right size of ESCO swage fittings and the correct dies.



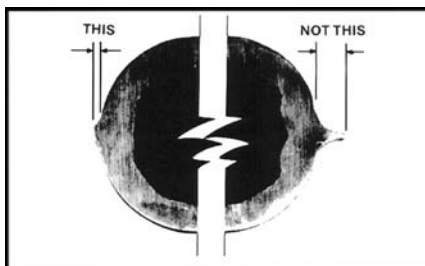
## Step 2

Make sure the rope end is fully inserted on the sleeve, so that it touches the end of the sleeve.



## Step 3

Place the sleeve in the center of the die with the offset facing upward. For 1/8" through 3/8" sleeves, leave dies open 1/32" to 1/16" on first swaging to reduce flashing. For larger sleeve sizes, leave 1/8" gap between the dies on the first swaging.



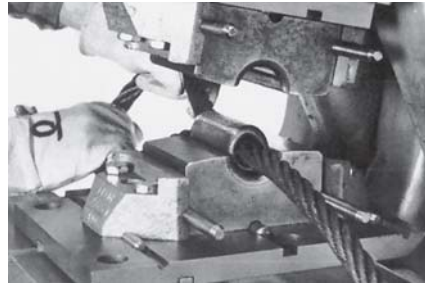
## Step 4

Do not form excessive "flash" on the first swaging. Flash should look like the slight bump on the left – not sharp like the bump on the right.

## Step 5

Rotate sleeve  $45^\circ$  ( $1/8$  turn) to remove flash in second swage. Do not place flash in the bottom of the die channel. Close dies fully to ensure maximum gripping strength of the sleeve on the third and final swaging.

**Note:** When swaging  $1/8"$ ,  $3/16"$ , or  $1/4"$  duplex sleeves, rotate the sleeve  $90^\circ$  for the second swaging to reduce die shift. This is a deviation from the normal practice of a  $45^\circ$  rotation.



## Step 6

Check again to make sure the wire rope is still bottomed in the sleeve.



# How to Swage ESCO® Stainless Steel Two-Piece Duplex Sleeves

## Tough and Flexible

ESCO two-piece duplex sleeves are designed to give you maximum gripping power on wire rope. In addition, these sleeves offer greater flexibility and permit users to swage larger rope sizes with swagers of limited capacity.

These sleeves are designed to be used on 6 x 19 classification, right regular lay, E.I.P., I.W.R.C. wire rope manufactured to U.S. specifications. If other constructions of wire rope are to be used, sample assemblies should first be swaged and properly tested.

## Check Dies for Wear

Before swaging, check your dies with ESCO die gauges to be certain they are in good condition

## Lubricate Dies

Use E.P. No. 1 or No. 2 Extreme Pressure Grease to lubricate dies or sleeves before swaging.

## Die selection

Use the chart below to select the correct dies:

ESCO Stainless Steel 2 PC. Duplex Sleeves		ESCO Stainless Steel	
Sleeve (Rope) Size	Die Description*	Die Part Number	
		Mk 75/87 Swagers	Mk 100 & Larger Swagers
1/2"	1/2" Open Channel	4016518	4003340
9/16"	5/8" Open Channel	4016522	4003342
5/8"	5/8" Open Channel	4016522	4003342
3/4"	3/4" Open Channel	4016523	4003343
<i>Note: 3/4" is maximum size for Mark 75 swager</i>			
7/8"	7/8" Open Channel	4091003	4003344
<i>Note: 7/8" is maximum size for the Mark 87 swager</i>			
1"	1" Open Channel		4003345
<i>Note: 1" is maximum size for the Mark 100 swager</i>			
1-1/8"	1-1/8" Open Channel		4003346
1-1/4"	1-1/4" Open Channel		4003347
1-3/8"	1-1/4" Open Channel		4003347
1-1/2"	1-1/2" Open Channel		4003348
<i>Note: 1-1/2" is maximum size for the Mark 150 swager</i>			
1-5/8"	1-3/4" Open Channel		4048572
1-3/4"	1-3/4" Open Channel		4048572
2"	2" Open Channel		4048598
<i>Note: 2" is maximum size for the Mark 200 swager</i>			
2-1/4"	2-1/4" Open Channel		4048599
2-1/2"	2-1/2" Open Channel		4048600
<i>Note: 2-1/2" is maximum size for the Mark 250 swager</i>			

**▲ Warning:** When using 2-1/2" x 5" dies in Mark 200 or Mark 250 swagers, always adjust the hydraulic relief pressure to 1300 psi maximum (Mark 200) 1150 psi maximum (Mark 250).

## Step 1

Slip the two sleeves on the wire rope and insert rope end through both. Position sleeves two to three sleeve lengths apart. Allow enough rope to extend past sleeve end to compensate for swaging elongation.

**IMPORTANT:** Make sure you use the right size of wire rope, the right size of ESCO swage fittings and the correct dies.



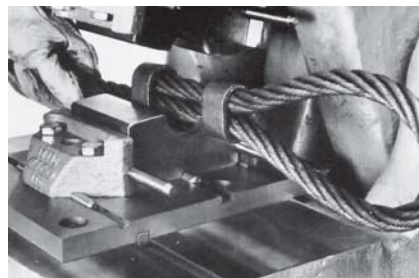
## Step 2

Swage the sleeve farthest from the rope eye first. **Do not** try to swage both sleeves at the same time.



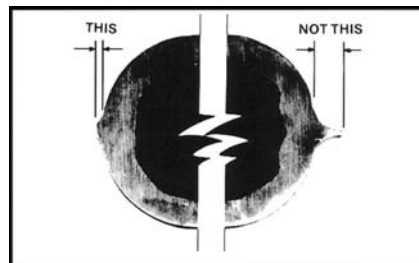
## Step 3

Place the end sleeve in the center of the die for swaging. For 1/2" to 1-1/2" sleeves, leave dies open 1/8" on the first swaging, do not close fully. To reduce flash on 1-3/4" and larger sleeves, tilt sleeve slightly toward main pin and close swager, leaving 3/16" gap between dies on first swaging.



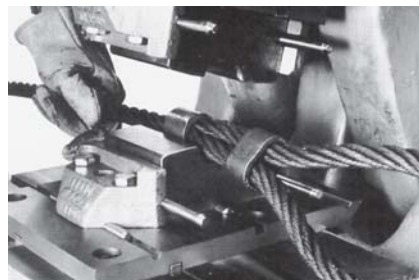
## Step 4

Do not form excessive "flash" on the first swaging. Flash should look like the slight bump on the left – not sharp like the bump on the right.



## Step 5

Rotate sleeve 45° (1/8 turn) to remove flash in second swaging. Do not place flash in bottom of die channel. Close dies fully to ensure maximum gripping strength of the sleeve on the third and final swaging.



## Step 6

Swage second sleeve in the same way, using the procedures in Steps 3 - 5.



## Tips for Making Flemish Eyes

Here are some general instructions for making Flemish eyes, also called “Farmer’s eyes”.

### Separating Rope Strands

For ropes with an independent wire rope core (I.W.R.C.) separate the strands into two groups with the core and 3 strands, the other with 3 strands only.

The starting point of separating the strands will determine the length of the strand ends at the throat of the splice. If the strand ends are shorter than desired, relay the strands and start one strand to the left. To shorten the strand ends, move one strand to the right.



### Step 1

Select the proper size sleeve and slip it on the wire rope.

**IMPORTANT:** Make sure you use the right size of wire rope, the right size of ESCO swage fittings and the correct dies.



### Step 2

Divide the rope strands into two groups and unlay the strands seven full lays, not counting the cut lay. Place the group with the core on the right as you face the “Y” formed by the two legs. Seven lays of rope give maximum efficiency, with no advantage in using more.



### Step 3

Cross the 3 strand group over the core group. Then bring the core group over the 3 strand group and down into the eye formed until their strands conform to their natural configuration.

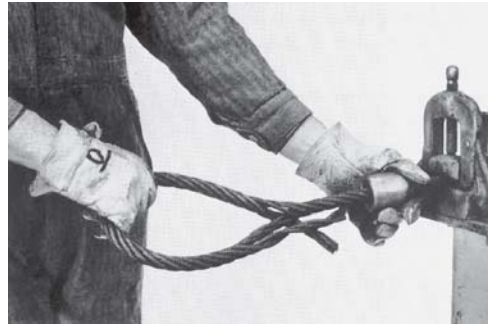


### Step 4

Continue to relay or rewind the 3 strand group around the core group with all strands in their natural spirals.

### Step 5

Continue relaying.



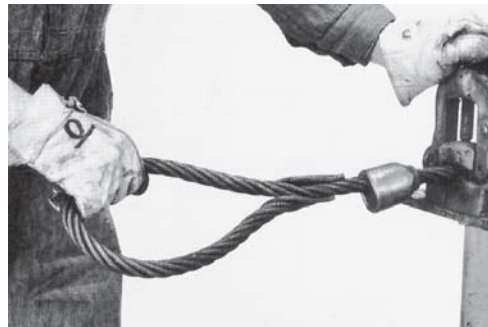
### Step 6

Continue relaying until the tails are at the "throat" of the eye.



### Step 7

Position the strand ends and core ends evenly around the "throat" of the splice.



### Step 8

Drive the sleeve over the strands until they bottom in the sleeve. Be careful that none of the strands back up to expose the core in the eye.

If tails are too long for the sleeve to cover, then unlay the eye and remake. Separating strands one to the right (see page 14 for separating strands).



### Step 9

Select the correct dies and swage according to the instructions on pages 8 and 16-21.



# How to Swage ESCO® Stainless Steel Single Sleeves for Flemish Eyes

## Fast, Rugged Eye Splices

ESCO stainless steel single sleeves are ideal for use with Farmer's or Flemish eye splices. These rugged fittings combine the holding power of a rolled eye splice with the inherent durability and toughness of ESCO stainless steel.

ESCO stainless single sleeves are designed to swage in the same open channel dies as ESCO duplex sleeves, eliminating the extra cost of special tapering dies necessary for carbon steel single sleeves.

These sleeves are designed to be used on 6 x 19 classifications, right regular lay, E.I.P., I.W.R.C. wire rope manufactured to U.S. specifications. If other constructions of wire rope are to be used, sample assemblies should first be swaged and properly tested.

## Check Dies for Wear

Before swaging, check your dies for wear with ESCO die gauges to be certain they are in good condition

## Lubricate Dies

Use E.P. No. 1 or No. 2 Extreme Pressure Grease to lubricate dies or sleeves before swaging.

## Die Selection

Use the chart below to select the correct dies:

ESCO Stainless Steel Single Sleeves				
Sleeve (Rope) Size	Die Description*	Die Part Number		
		Mark 75/87 Swagers	Mark 100 & 150 Swagers	Mark 200 & Larger Swagers
5/16"	3/8" Open Channel	4016520	4003338	
3/8"	3/8" Open Channel	4016520	4003338	
7/16"	1/2" Open Channel	4016518	4003340	
1/2"	1/2" Open Channel	4016518	4003340	
5/8"	5/8" Open Channel	4016522	4003342	
<i>Note: 5/8" is maximum size for the Mark 75 swager</i>				
7/8"	7/8" Open Channel	4091003	4003344	
3/4"	3/4" Open Channel	4016523	4003343	
<i>Note: 3/4" is maximum size for the Mark 87 swager</i>				
1"	1" Open Channel		4003345	
1-1/8"	1-1/8" Open Channel		4003346	
1-1/4"	1-1/8" Open Channel		4003346	
<i>Note: 1-1/4" is maximum size for the Mark 150 swager</i>				
1-3/8"	1-1/4" Open Channel		4003347	
1-1/2"	1-1/2" Open Channel		4003348	
1-3/4"	1-3/4" Open Channel			4048572
2"	2" Open Channel			4048598
<i>Note: 2" is maximum size for the Mark 200 swager</i>				
2-1/4"	2-1/4" Open Channel			4048599
2-1/2"	2-1/2" Open Channel			4048600
<i>Note: 2 1/2" is maximum size for the Mark 250 swager</i>				

**▲ Warning:** When using 2-1/2" x 5" dies in Mark 200 or Mark 250 swagers, always adjust the hydraulic relief pressure to 1300 psi maximum (Mark 200) 1150 psi maximum (Mark 250).

### Step 1

Slip the sleeve on the wire rope.

**IMPORTANT:** Make sure you use the right size of wire rope, the right size of ESCO swage fittings and the correct dies.



### Step 2

Unlay seven full lays of rope. See "Hints for making Flemish Eyes" on page 14.



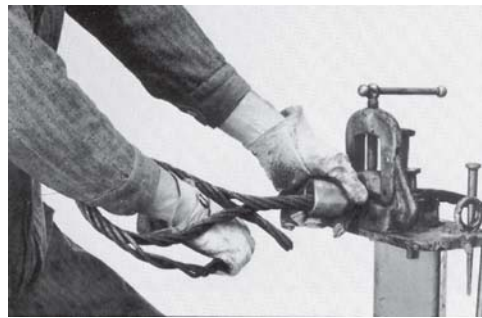
### Step 3

Form the Flemish eye.



### Step 4

Continue forming the Flemish eye.



### Step 5

Continue forming the Flemish eye.

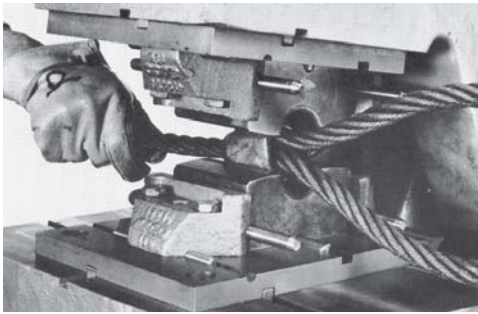


# How to Swage ESCO® Stainless Steel Single Sleeves for Flemish Eyes



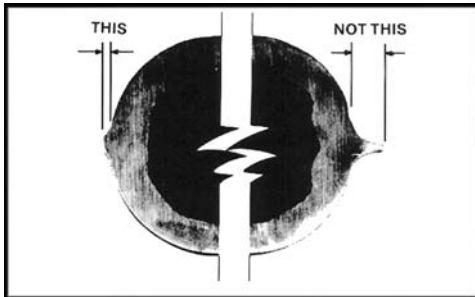
## Step 6

Drive the sleeve fully over the strand ends. Be sure it fits completely over the “throat” or junction of the Flemish eye for maximum gripping strength.



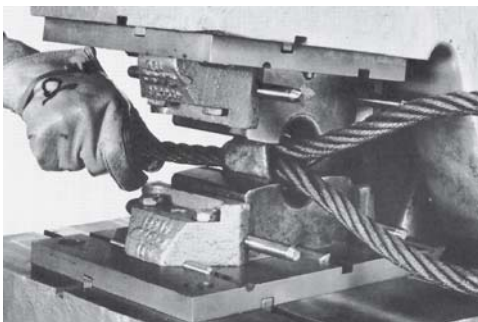
## Step 7

Place the sleeve in the center of the die channel for swaging. For 5/16" to 7/16" sleeves, allow 1/32" to 1/16" gap between dies on the first swaging. For 1/2" top 1-1/2" sleeves, this gap should be 1/8". To reduce flash on 1-3/4" and larger sleeves, leave 3/16" gap between dies on first swaging.



## Step 8

Do not form excessive “flash” on the first swaging. Flash should look like the slight bump on the left, not sharp like the bump on the right.



## Step 9

Rotate sleeve 45° (1/8 turn) to remove flash in second swaging. Do not place flash in bottom of die channel. Close dies fully to ensure maximum gripping strength of the sleeve on the third and final swaging.

# How to Swage ESCO® Carbon Steel Single Sleeves for Flemish Eyes

## Economical Sleeve For Flemish Eyes

ESCO standard carbon steel sleeves are designed for use with Flemish eyes (Farmer's eyes) and for swaging in standard tapering dies. Tapering dies are available for all ESCO Mark Series swagers.

These sleeves are designed to be used on 6 x 19 classifications, right regular lay, E.I.P., I.W.R.C. wire rope manufactured to U.S. specifications. If other constructions of wire rope are to be used, sample assemblies should first be swaged and properly tested.

## Special Instructions

### 1/4" through 7/8" Sleeves

For these smaller sizes, you only need to use tapered dies. Position the fitting near the center of the die-pocket – do not place it at either end of the tapered pocket. Work the sleeve until the dies close fully. Do not allow sharp flashing to form.

#### 1/4" - 1/2" sleeves

**1st swaging** – allow dies to remain open approximately 1/8".

Rotate fitting 45° (1/8 turn).

**2nd swaging** – allow dies to remain open approximately 1/16".

Rotate fitting 45° (1/8 turn) back to original position.

**3rd swaging** – close dies fully.

**4th swaging** – may be required to provide smooth finish.

#### 9/16" - 7/8" sleeves

Same procedure as above – allow dies to remain open 1/4" on first swaging, 1/8" on second swaging. Rotate fitting 45° (1/8 turn) between each swaging. Close dies fully on 3rd swaging and finish with 4th swaging if necessary.

## 1" through 1-3/4" Sleeves

Use open channel dies as the first stage to form the sleeve before second stage swaging in tapered dies. Swage each fitting at least three times in open channel dies. Allow dies to remain open 3/8" for the first swage and 3/16" on the second swage. However, should sharp flashing occur, the dies should be allowed to remain open approximately 1/8" on the third swage. Rotate sleeve 45° between each swage. Change to tapering dies. When 1", 1-1/8" and 1-1/4" sleeves are swaged in tapering dies, allow dies to remain open 3/8" on the first swage and 3/16" on the second swage. If sharp flashing does not occur, dies may be closed on the third swage. A fourth swage is sometimes required to provide a smooth finish. For 1-3/8", 1-1/2", and 1-3/4" sleeves, allow dies to remain open 1/2" on the first swage, 3/8" on second swage, and 3/16" on the third swage. On fourth swage dies may be closed if no large flash occurs. A fifth swage may be required to provide a smooth finish. Rotate the sleeve 45° between each swage. Dies must be fully closed along edge closest to the main pin before swaging is complete.

## 2" and 2-1/2" Sleeves

Open channel dies are used for both the 1st stage and 2nd stage of the 2" and 2-1/2" carbon steel sleeves. Each fitting is to be swaged at least five times in the first stage die. Allow the die to remain open approximately 5/8" on the first swage, 1/2" on the second swage, 3/8" on the third swage, 1/4" on the fourth swage and close on the fifth swage.

However, if sharp flashing occurs, allow the dies to remain open 1/8" on the fifth swage. Then close the dies when there is no longer a sharp flash. Rotate the sleeve 45° between each swaging operation. When using the second stage die, each sleeve must be swaged at least seven times. Allow the dies to remain open 3/4" on the first swage, 5/8" on the second swage, 1/2" on the third swage, 3/8" on the fourth swage, 1/4" on the fifth swage, 1/8" on the sixth swage and close on the seventh swage if no large flash develops. Another swage may be required to provide a smoother finish. Rotate the sleeve 45° between each swage. Dies must be fully closed along the edge closest to the main pin before swaging is complete.

# How to Swage ESCO® Carbon Steel Single Sleeves for Flemish Eyes

## Check Dies for Wear

Before swaging check your dies with ESCO die gauges to be certain they are in good condition.

## Lubricate Dies

Use E.P. No. 1 or No. 2 Extreme Pressure Grease to lubricate dies or sleeves before swaging.

## Die Selection

Use the chart below to select the correct dies.

**Note:** 5/16", 7/16", and 9/16" sleeves swage in the next larger standard die sizes.

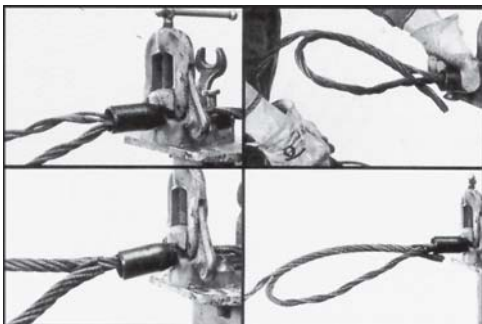
ESCO Carbon Steel Single Sleeves							
Sleeve (Rope) Size	Die Description	Part Number		Sleeve (Rope) Size	Die Description	Part Number	
		Mark 75/87	Mark 100 & Larger		1 st Stg./2nd. Stg.	Mark 100 & Larger	
1/4"	1/4" Taper	4016223	4003349	1"	1" Open/1" Taper	4003345	4003354
5/16"	3/8" Taper	4016223	4003349	<b>NOTE:</b> 1" is maximum for the Mark 100 swager			
3/8"	3/8" Taper	4016223	4003349	1-1/8"	1-1/8" Open/1-1/8" Taper	4003346	4003355
7/16"	1/2" Taper	4016224	4003350	1-1/4"	1-1/4" Open/1-1/4" Taper	4003347	4003356
1/2"	1/2" Taper	4016224	4003350	1-3/8"	1-1/2" Open/1-3/8" Taper	4003348	4003357
9/16"	5/8" Taper	4016225	4003351	1-1/2"	1-1/2" Spl. Open/1-1/2" Taper	4006473	4003358
5/8"	5/8" Taper	4016225	4003351	<b>NOTE:</b> 1-1/2" is maximum for the Mark 150 swager			
3/4"	3/4" Taper	4016226	4003352	1-3/4"	2" Open/ 1-3/4" Taper	4048598	4070864
<b>NOTE:</b> 3/4" maximum size for the Mark 75/87 swager				2"	2-1/4" Open/2" Open	4048599	4048598
				<b>NOTE:</b> 2" is maximum size for the Mark 200 swager			
7/8"	7/8" Taper		4003353	2-1/2"	2-1/2" Open/2-1/2" 2nd Stg.	4070866	4070865
				<b>NOTE:</b> 2-1/2" is maximum size for the Mark 250 swager			



## Step 1

Slip the sleeve on the wire rope.

**IMPORTANT:** Make sure you use the right size of wire rope, the right size of ESCO swage fittings and the correct dies.

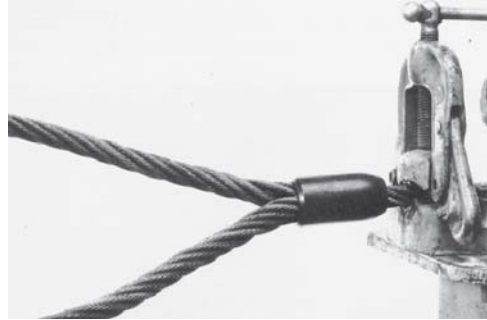


## Step 2

Form the Flemish eye. See "Tips for Making Flemish Eyes" on page 14.

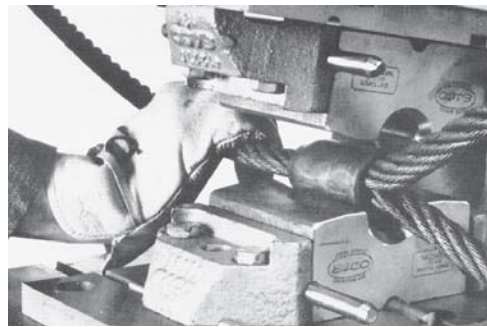
### Step 3

Drive the sleeve over the strand ends, making sure it fits completely over the “throat” or junction of the Flemish eye for maximum gripping strength.



### Step 4

Place sleeve in center of die channel. Be sure it does not touch the ends of the tapered pocket.



### Step 5

Follow the swaging steps described on page 19 for the various size sleeves. Rotate sleeve 45° (1/8 turn) between each swaging.

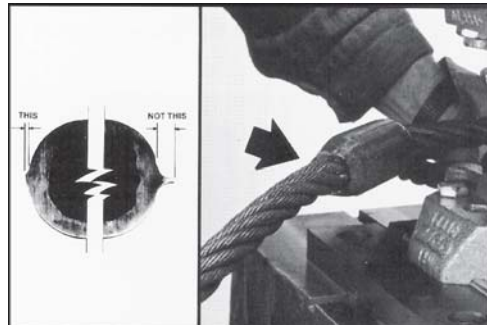


### Step 6

Do not allow sharp flashing to form. Flash should be only a small bump as shown at right. Do not place flash at bottom of die channel or pocket. Inspect finished swaging to be sure rope is bottomed in sleeve.

### Step 7

Carbon steel sleeves 1" and larger should be swaged first in open channel dies and then finish swaging in tapering dies (see Special Instructions on page 19).



# How to Swage ESCO® Cast Stainless Steel Open and Closed Sockets/5/16" through 1-1/8"

## Fast Installation, Long Service Life

ESCO Cast Stainless Steel Swage Sockets are made with ESCO 40 stainless steel swaging alloy to provide ideal swaging characteristics. These sockets have tapered shanks to provide a firm but gradual grip on the rope for maximum rope life and efficiency.

These sockets are designed to be used on 6 x 19 classifications, right regular lay, E.I.P., I.W.R.C. wire rope manufactured to U.S. specifications. If other constructions of wire rope are to be used, sample assemblies should first be swaged and properly tested.

**Note:** The swaging instructions on these pages are for ESCO cast smooth bore sockets. Contact your ESCO representative for swaging information about earlier ESCO "screwy" cast sockets.

## Check Dies for Wear

Before swaging, check your dies for wear with ESCO die gauges to be certain they are in good condition.

## Lubricate Dies

Use E.P. No. 1 or No. 2 Extreme Pressure Grease to lubricate dies or sockets before swaging.

## Die Selection

To be sure of attaining best performance, it is recommended that you use only ESCO dies for swaging ESCO sockets. Use the chart below to select the correct dies.

### IMPORTANT:

ESCO Cast Stainless Steel Sockets			
Socket (Rope) Size	Die Description*	Die Part Number	
		Mk 75/87 Swagers	Mk 100 & Larger Swagers
5/16"	3/8" Open	4016520	4003338
3/8"	3/8" Open	4016520	4003338
7/16"	1/2" Open	4016518	4003340
1/2"	1/2" Open	4016518	4003340
9/16"	5/8" Open	4016522	4003342
5/8"	5/8" Open	4016522	4003342
<b>NOTE: 5/8" is maximum size for the Mark 75/87 swager</b>			
3/4"	3/4" Open Channel	4003343	
<b>NOTE: 3/4" is maximum size for the Mark 100 swager</b>			
7/8"	3/4" Open Channel	4003343	
1"	7/8" Open Channel	4003344	
1-1/8"	1" Open Channel	4003345	
<b>NOTE: 1-1/8" is maximum for the Mark 150 swager</b>			

\*Refer to page 8 for diameters of open channel dies.

Socket (Rope) Size	Minimum Amount of Rope to Insert in Socket
5/16"	2-1/4"
3/8"	2-1/4"
7/16"	3"
1/2"	3"
9/16"	3-3/4"
5/8"	3-3/4"
3/4"	4-1/8"
7/8"	5-1/8"
1"	6"
1-1/8"	8-9/16"

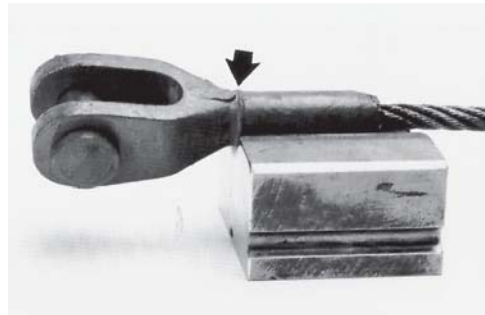
## Step 1

Mark the proper length on the wire before installing the socket. See page 22 for minimum length of rope to insert into socket.



## Step 2

Slip the socket onto the wire rope until the mark is flush with the end of the socket. Be sure it's fully inserted beyond the ring on the shank.



## Step 3a

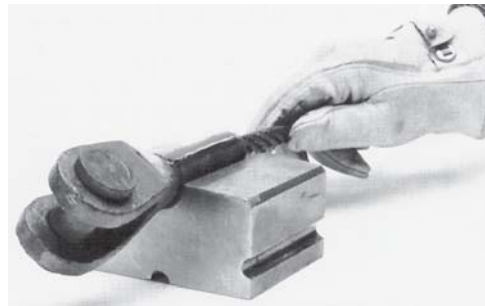
Swage sockets 5/16" through 5/8" full length on first swaging.

## Step 3b

Rotate socket 45° (1/8 turn) and close dies fully on second swage to eliminate flash.

**IMPORTANT:** Dies must close fully on last swaging to ensure maximum gripping strength of socket.

**Note:** When swaging 9/16" or 5/8" sockets in Mark 75 swager, use the 3 stage swaging method described in steps 5a and 5b on page 23.



## Step 4a

Swage 3/4" and 7/8" sockets in two stages: swage one-half the shank at a time, swaging rope end first.

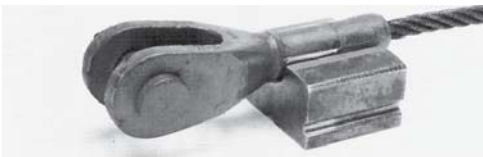


# How to Swage ESCO® Cast Stainless Steel Open and Closed Sockets/5/16" through 1-1/8"



## Step 4b

Rotate socket 45° (1/8 turn) and make second swaging, closing dies fully to eliminate flash.



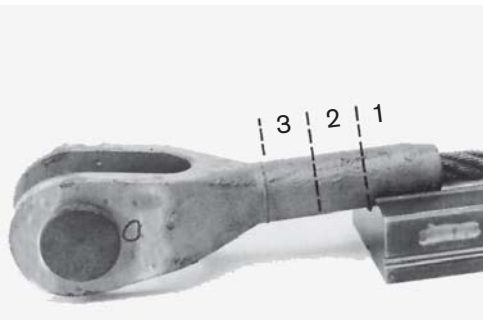
## Step 4c

Move other half of socket into dies and make first swaging, closing dies fully.



## Step 4d

Rotate socket 45° (1/8 turn) and make second swaging to eliminate flash.

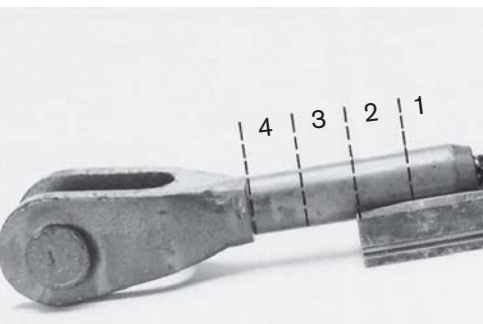


## Step 5a

Swage 1" sockets in three stages: swage 1/3 of shank starting at rope end.

## Step 5b

Rotate socket 45°, make second swaging, closing dies fully. Repeat for center third of shank and repeat again for final third of shank.



## Step 6

Swage 1-1/8" sockets in four stages. Use same procedure as described previously.

# How to Swage ESCO® Forged Open and Closed Sockets/1/4" through 1-1/4"

## Fast Installation, Long Service Life

ESCO Forged Sockets are made of special alloys to provide ideal swaging characteristics. In addition, these sockets have tapered shanks to provide a firm but gradual grip on the rope for maximum rope life and efficiency.

These sockets are designed to be used on 6 x 19 classifications, right regular lay, E.I.P., I.W.R.C. wire rope manufactured to U.S. specifications. If other constructions of wire rope are to be used, sample assemblies should first be swaged and properly tested.

**Note:** The swaging instructions on these pages are for ESCO forged sockets. Refer to pages 23-24 for swaging information about ESCO cast swage sockets. **Dies for swaging the older ESCO cast sockets and the dies for swaging forged sockets may not be used interchangeably.**

## Check Dies for Wear

Before swaging, check your dies for wear with ESCO die gauges to be certain they are in good condition.

## Lubricate Dies

Use E.P. No. 1 or No. 2 Extreme Pressure Grease to lubricate dies or sockets before swaging.

## Die Selection

To be sure of attaining full efficiency, it is recommended that you use only ESCO dies for swaging ESCO sockets. Use the chart below to select the correct dies.

Use these dies for forged sockets:

ESCO Forged Sockets			
Socket (Rope) Size	Die Description*	Die Part Number	
		Mk 75/87 Swager	Mk 100 & Larger Swagers
1/4"	1/4" Forged	4005874	4005864
5/16"	3/8" Forged	4005874	4005864
3/8"	3/8" Forged	4005874	4005864
7/16"	1/2" Forged	4005876	4005865
1/2"	1/2" Forged	4005876	4005865
9/16"	5/8" Forged	4005877	4005866
5/8"	5/8" Forged	4005877	4005866
<b>NOTE: 5/8" is maximum size for the Mark 75/87 swager</b>			
3/4"	3/4" Forged		4005867
<b>NOTE: 3/4" is maximum size for the Mark 100 swager</b>			
7/8"	7/8" Forged		4005868
1"	1" Forged		4005869
1-1/8"	1-1/8" Forged		4005870
1-1/4"	1-1/4" Forged		4003582
<b>NOTE: 1-1/4" maximum size for the Mark 150 swager</b>			

\*Refer to page 8 for die diameters.

## IMPORTANT:

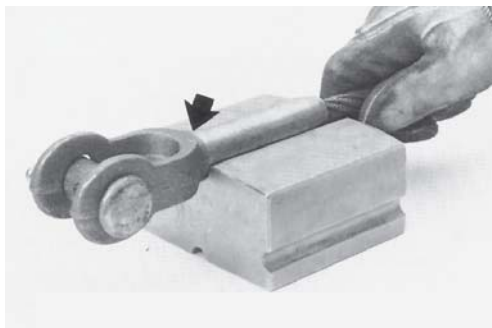
Socket (Rope) Size	Minimum Amount of Rope to Insert in Socket
1/4"	2"
5/16"	3"
3/8"	3"
7/16"	4"
1/2"	4"
9/16"	5"
5/8"	5"
3/4"	6"
7/8"	7"
1"	8"
1-1/8"	9"

# How to Swage ESCO® Forged Open and Closed Sockets/1/4" through 1-1/4"



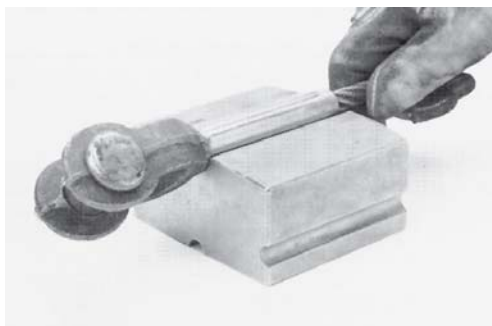
## Step 1

Mark the proper length on the wire before installing the socket. See page 25 for minimum length of rope to insert into socket.



## Step 2

Slip the socket onto the wire rope until the mark is flush with the end of the socket. Be sure it is fully inserted beyond the machined portion of the shank.



## Step 3a

Swage sockets 1/4" through 5/8" full length on first swaging.

## Step 3b

Rotate socket 45° (1/8 turn) and close dies fully on second swage to eliminate flash.

**IMPORTANT:** Dies must close fully on last swaging to ensure maximum gripping strength of socket.

**Note:** When swaging 9/16" or 5/8" sockets in Mark 75 swager, use the 3 stage swaging method described in steps 5a and 5b on page 27.



## Step 4a

Swage 3/4" and 7/8" sockets in two stages. Swage 1/2 the shank at a time, swaging rope end first. Close dies fully.

### Step 4b

Rotate socket 45° (1/8 turn) and make second swaging, closing dies fully to eliminate flash.



### Step 4c

Move other half of socket into dies and make first swaging, closing dies fully.



### Step 4d

Rotate socket 45° (1/8 turn) and make second swaging to eliminate flash.

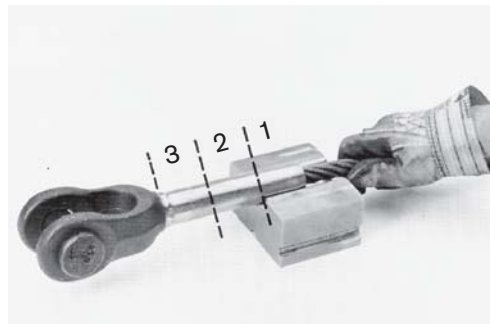


### Step 5a

Swage 1" sockets in three stages: swage one third of shank starting at rope end.

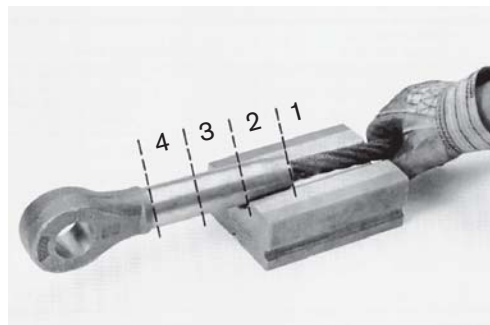
### Step 5b

Rotate socket 45°, make second swaging, closing dies fully. Repeat for center third of shank and again for final third of shank.



### Step 6

Swage 1-1/8" sockets in four stages. Use the same procedure as described previously.



# How to Swage Large ESCO® Forged Open and Closed Sockets/1-1/4" through 2"

## Fast Installation, Long Service Life

ESCO Forged Sockets are made of special alloys to provide ideal swaging characteristics. In addition, these sockets have tapered shanks to provide a firm but gradual grip on the rope for maximum rope life and efficiency.

These sockets are designed to be used on 6 x 19 classifications, right regular lay, E.I.P., I.W.R.C. wire rope manufactured to U.S. specifications. If other constructions of wire rope are to be used, sample assemblies should first be swaged and properly tested.

**Note:** The swaging instructions on these pages are for ESCO forged sockets. Refer to page 22 for swaging information about ESCO cast swage sockets. Dies for swaging the older ESCO cast sockets and the dies for swaging forged sockets may not be used interchangeably.

ESCO Forged Sockets		
Socket (Rope) Size	Die Description*	Die Part Number
		Mk 200 & Larger Swagers
1-1/4"	1-1/4" Forged	4003254
1-3/8"	1-3/8" Forged	4003255
1-1/2"	1-1/2" Forged	4003256
1-3/4"	1-3/4" Forged	4003257
2"	2" Forged	4003258

## Check Dies for Wear

Before swaging, check your dies for wear with ESCO die gauges to be certain they are in good condition.

## Lubricate Dies

Use E.P. No. 1 or No. 2 Extreme Pressure Grease to lubricate dies or sockets before swaging.

## Die Selection

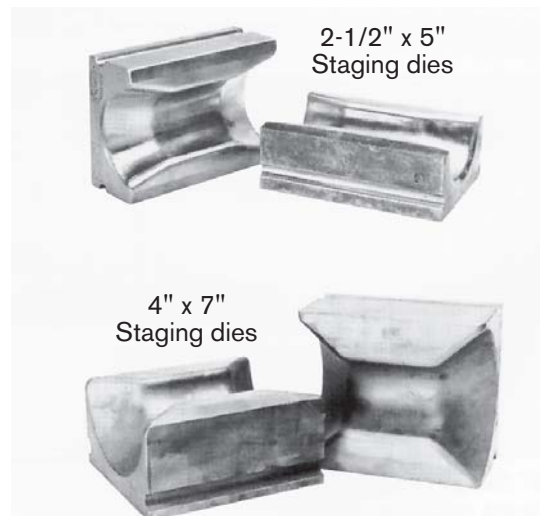
When using 2-1/2" x 5" section dies, reduce pressure to 1300 psi on the Mark 200 swager and 1150 on the Mark 250 swager to avoid excessive pressure on dies.

Use the chart below to select the correct dies.

Use these dies for forged sockets:

### IMPORTANT:

Socket (Rope) Size	Minimum Amount of Rope to Insert in Socket
1-1/4"	10"
1-3/8"	11"
1-1/2"	12"
1-3/4"	14"
2"	16"



Refer to page 8 for diameters of staging dies.

### Step 1

Mark the proper length on the wire rope before installing the socket. See page 28 for minimum length of rope to insert into socket.



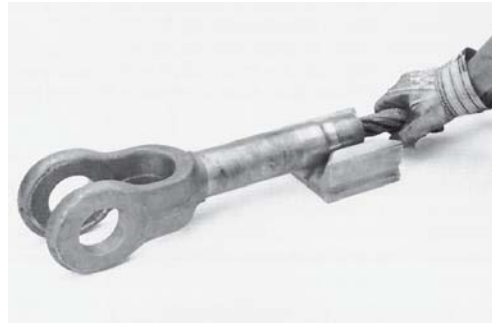
### Step 2

Slip the socket onto the wire rope until the mark is flush with the end of the socket. Be sure it is fully inserted beyond the machined portion of the shank.



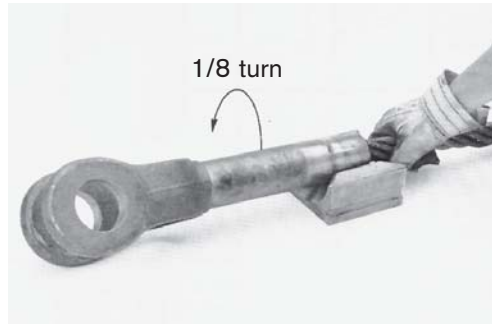
### Step 3

Swage 1-1/4", 1-1/2", 1-3/8" sockets in 4 stages in the Mark 200 swager and 1-3/4", 2" sockets in 5 stages in the Mark 250 swager. Swage 1/4 or 1/5 of the socket shank length starting with the rope end.

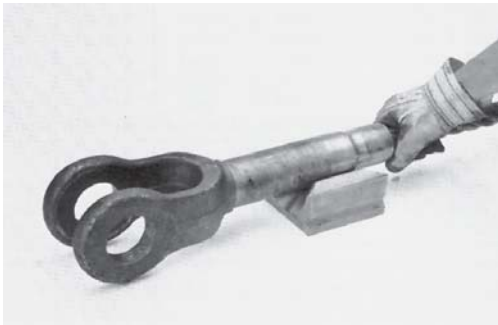


### Step 4

Rotate socket 45° (1/8 turn) and swage again to eliminate flash. Close dies fully.

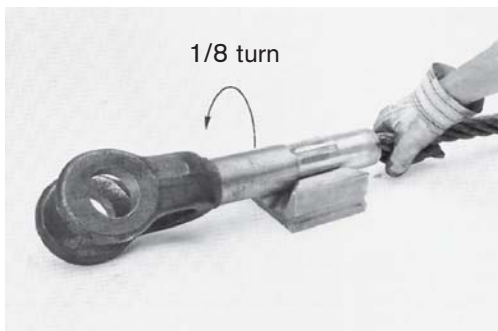


## How to Swage ESCO® Forged Open and Closed Sockets/1-1/4" through 2"



### Step 5

Repeat the above steps for the next 1/4 or 1/5 of the shank, depending on socket size.



### Step 6

Be sure to rotate socket between each swaging to keep flash out of bottom of channel.



### Step 7

Repeat swaging and rotating the remaining sections of the shank until you've swaged the full length.

# How to Swage ESCO® Choker Ferrules

## ESCO “Screwy” Choker Ferrules and Machined Choker Ferrules

Both of these types of ferrules are designed for use on 6 x 19 classification, right regular lay, E.I.P., I.W.R.C., wire rope manufactured to U.S. specifications. If other constructions of wire rope are to be used with these swage fittings, sample assemblies should be made first and properly tested.

### Die Selection

Use the charts below to select the correct die size for each ferrule. ESCO “screwy” and machined choker ferrules are numbered to designate the correct rope size of the Bardon type hook they are to be used with.

### Check Dies for Wear

Before swaging, check your dies for wear with ESCO die gauges to be certain they are in good condition.

### Lubricate Dies

Use E.P. No. 1 or No. 2 Extreme Pressure Grease to lubricate dies or ferrules before swaging.

Use these dies for choker ferrules:

ESCO Choker Ferrules		ESCO Swaging Die Part Numbers				
Rope Size	Ferrule Size	Mk 75/87 Front Entry	Side Entry	Mk 100/150 Front Entry	Side Entry	Mk 200/250 Side Entry
3/8"	MM3P	4016782	4069623	4016528	4069624	
7/16"	MM7/16P	4016782	4069623	4016528	4069624	
1/2"	MM4P	4016782	4069623	4016528	4069624	
1/2"	M4P Cast	4016782	4069623	4016528	4069624	
<b>NOTE:</b> Midget is maximum size for the Mark 75/87 swager						
5/8"	D5P Cast			4016530	4069625	
5/8"	D5M			4016530	4069625	
5/8"	B5P Cast			4016532	4069626	
5/8"	B5M			4016532	4069626	
3/4"	B6P Cast			4016532	4069626	
3/4"	B6M			4016532	4069626	
<b>NOTE:</b> Bantam is maximum size for the Mark 100 swager						
3/4"	L6P Cast				4069627	4052904
3/4"	L6M				4069627	4052904
7/8"	L7P Cast				4069627	4052904
7/8"	L7M				4069627	4052904
1"	L8P Cast				4069627	4052904
1"	L8M				4069627	4052904
7/8"	J7P Cast				4069628	4112818
7/8"	J7M				4069628	4112818
1"	J8P Cast				4069628	4112818
1"	J8M				4069628	4112818
1-1/8"	J9P Cast				4069628	4112818
1-1/8"	J9M				4069628	4112818

**Note:** To obtain maximum holding efficiencies, use pocket dies for all ferrules.



# How to Swage ESCO® Choker Ferrules

**IMPORTANT:** Follow these instructions carefully to minimize die wear. This is very important for MM ferrules and midget dies.



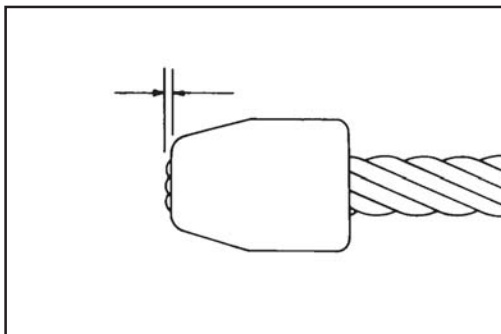
## Special Instructions

Most ESCO swage ferrules must be hammered onto the wire rope.

To facilitate installation onto the rope, rotate the ferrule in the direction of the rope lay while tapping the fitting with a hammer. A machinist's vise is also recommended over the conventional splicing vice because it provides a grip along a longer length of the rope, thus minimizing the tendency for individual wires to back up.

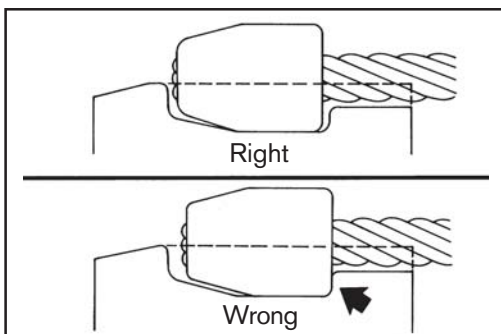
Should a single wire in a strand back up as you are installing the ferrule, often you can hammer the fitting about 1/2" farther than required and then tap the fitting back into place.

Shear type wire rope cutters leave jagged, rough ends. Whenever practical, an abrasive wheel cutter should be used. To reform wires which "broom out" during cutting, roll the rope end on the floor with your foot, applying slight downward pressure.



## Step 1

Slip the ferrule on the wire rope until end protrudes slightly from the end of the ferrule. After swaging, the rope end should be flush with the ferrule end.

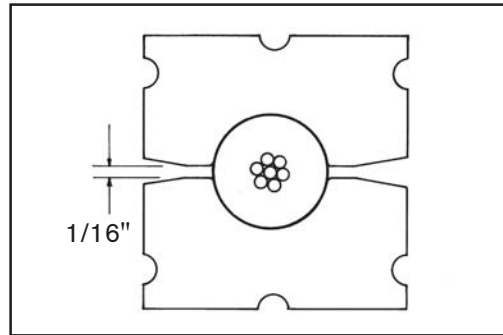


## Step 2

Center the ferrule in the die pocket. **Do not butt ferrule at either end of the pocket.**

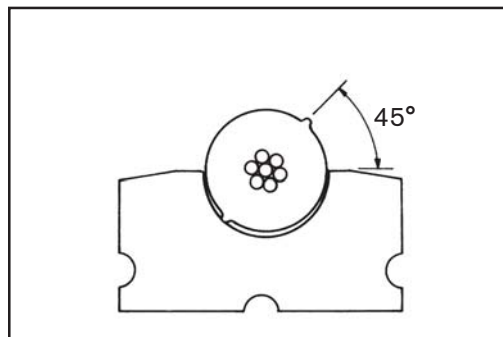
### Step 3

On the first swaging of smaller size ferrules, keep dies open  $1/16''$  so excessive flashing does not form. This is important for M and MM ferrules which swage in midget pocket dies. For larger ferrules, leave approximately  $1/8''$  gap between dies on first swaging to reduce flash.



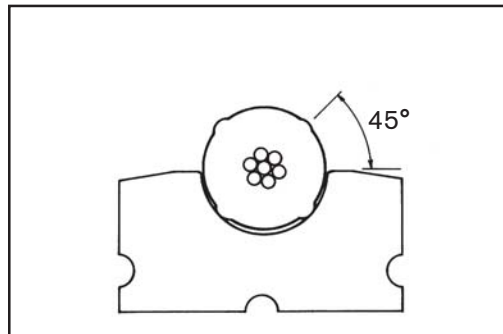
### Step 4

Rotate ferrule  $45^\circ$  ( $1/8$  turn) and make second swage. Do not place flash in bottom of die channel.



### Step 5

Rotate ferrule  $45^\circ$  ( $1/8$  turn) back to the original position and make the third swage to eliminate flash. Some ferrules, especially larger sizes, need four swagings. Be sure dies close completely on final swage.



# How to Swage ESCO® Drumline and End Ferrules

## ESCO “Screwy” Drumline Ferrules

These ferrules are shorter than choker ferrules in order to fit winch drum “pockets”. Because of their shorter length, holding power is lower – thus, the last windings of the drumline must never be played out to place a strain directly on the drumline ferrule.

## ESCO Machined End Ferrules

These special machined end fittings are designed for smaller hoists, winches, etc. and are not to be used with Bardon type hooks because of their shorter length – again, the last windings of the rope on the drum must not be played out to place a strain directly on the end fitting.

## ESCO “Screwy” Choker Ferrules and Machined Choker Ferrules

Both of these types of ferrules are designed for use on 6 x 19 classification, right regular lay, E.I.P., I.W.R.C., wire rope manufactured to U.S. specifications. If other constructions of wire rope are to be used with these swage fittings, sample assemblies should be made first and properly tested.

## Die Selection

Use the charts below to select the correct die size for each ferrule.

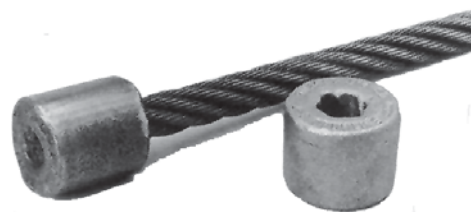
## Check Dies for Wear

Before swaging, check your dies for wear with ESCO die gauges to be certain they are in good condition

## Lubricate Dies

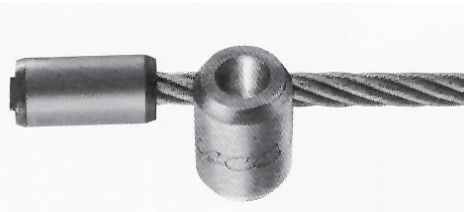
Use E.P. No. 1 or No. 2 Extreme Pressure Grease to lubricate dies or ferrules before swaging.

ESCO Cast Drumline			
Ferrule (Rope) Size	Size	Die Description*	Mk 100 & Larger Part Number
5/8"	DB5P	3/4" Open	4003343
3/4"	B6DL	3/4" Open	4003343
<i>NOTE : 5/8" is maximum size for the Mark 75/87 swager</i>			
3/4"	L6DL	1" Open	4003345
7/8"	L7DL	1" Open	4003345
1"	L8DL	1" Open	4003345
1"	J8DL	1-1/8" Open	4003346
1-1/8"	J9DL	1-1/8" Open	4003346
1-1/4"	J10DL	1-1/8" Open	4003346



**Note:** Drumline ferrules are not designed for use with hooks. Due to their shorter length, holding strength is less than that of choker ferrules. The words “Bantam”, “Light”, or “Junior” are for diameter reference only.

ESCO End Ferrules				
Ferrule (Rope) Size	Size	Die Description*	Part Number	
			Mk 75/87	MK 100 & Larger
3/16"	3/16" DE	1/4" Open	4016520	4003338
1/4"	1/4" DE	1/4" Open	4016520	4003338
5/16"	5/16" DE	3/8" Open	4016520	4003338
3/8"	3/8" DE	3/8" Open	4016520	4003338
7/16"	7/16" DE	7/16" Open	4016519	4003339
7/16"	7/16" DE	1/2" Open	4016518	4003340
1/2"	1/2" DE	1/2" Open	4016518	4003340
<i>NOTE: 1/2" is maximum size for the Mark 75/87 swagers</i>				
1/2"	TH-4	9/16" Open		4003341
9/16"	TH-9/16	9/16" Open		4003341



**Note:** End ferrules are not designed for use with Bardon type hooks.

## Special Instructions

Most ESCO swage ferrules must be hammered onto the wire rope.

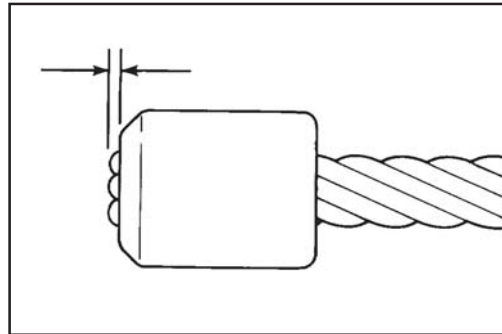
To facilitate installation onto the rope, rotate the ferrule in the direction of the rope lay while tapping the fitting with a hammer. A machinist's vise is also recommended over the conventional splicing vice because it provides a grip along a longer length of the rope, thus minimizing the tendency for individual wires to back up.

Should a single wire in a strand back up as you are installing the ferrule, often you can hammer the fitting about 1/2" farther than required and then tap the fitting back into place.

Shear type wire rope cutters leave jagged, rough ends. Whenever practical, an abrasive wheel cutter should be used. To reform wire which "broom out" after cutting, roll the rope end on the floor with your foot, applying slight downward pressure.

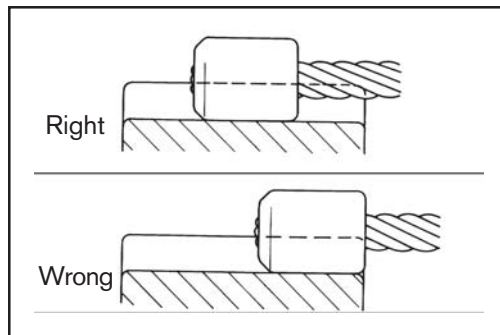
### Step 1

Slip the ferrule on the wire rope until end protrudes slightly from the end of the ferrule. After swaging, the rope end should be flush with the ferrule end.



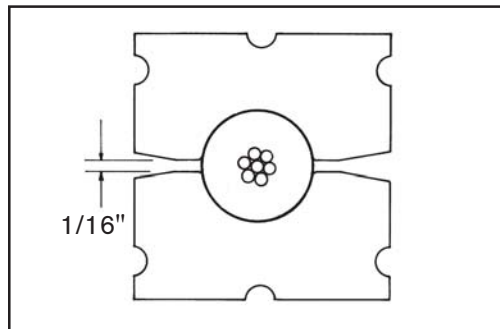
### Step 2

Center the ferrule in the die pocket. **Do not butt ferrule at either end of the pocket.**

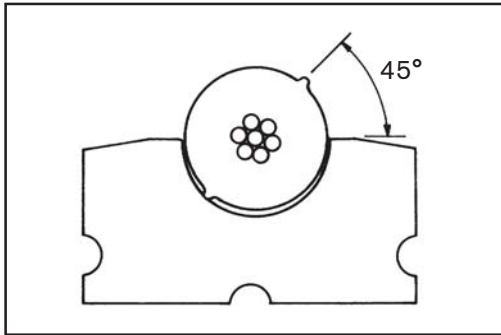


### Step 3

On the first swaging of 3/16" to 7/16" ferrules, keep dies open 1/16" so excessive flashing does not form. This is important for small end ferrules. For larger ferrules, leave approximately 1/8" gap between dies on first swaging to reduce flash.

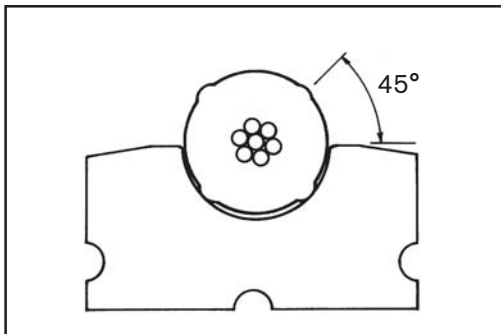


## How to Swage ESCO® Drumline and End Ferrules



### Step 4

Rotate ferrule 45° (1/8 turn) and make second swage. Do not place flash in bottom of die channel.



### Step 5

Rotate ferrule 45° (1/8 turn) back to the original position and make the third swage to eliminate flash. Some ferrules, especially larger sizes, need four swagings. Be sure dies close completely on final swage.

## How to Use ESCO® Swage Die Wear Gauges

### Check Your Dies for Wear

Check the accuracy of your ESCO open channel, staging, tapering, and ferrule dies with ESCO Die Wear Gauges. They are the only method of measuring the close tolerances that must be maintained.

### Remove Dies from Swager

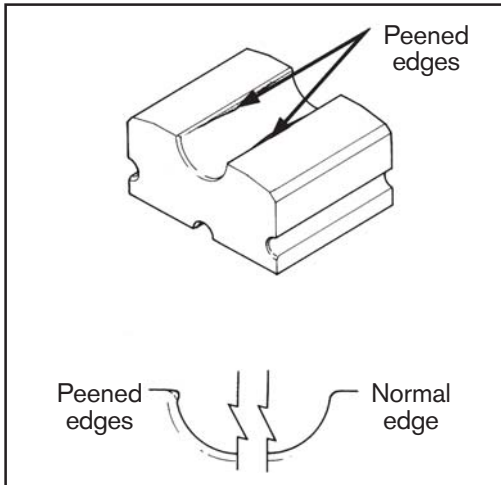
Always remove dies from swager before using die gauges to check them.

ESCO swage dies are made of special alloy steel to exacting specifications. However, even the best steel wears through normal usage. Wear rate varies with the type of fittings being swaged, abrasiveness of material, proper lubrication, and volume of swagings.

Use ESCO die gauges periodically to be sure that your dies remain able to produce high quality swaged assemblies that your business depends upon. Gauges are available for all ESCO dies and are accurate and easy to use.



## How to Use ESCO® Swage Die Wear Gauges



### Grind Away Peened Edges

Occasionally dies become peened or pushed inward at the lips where the two die halves make contact. This is caused by flash or foreign material getting between the flat surfaces of the dies.

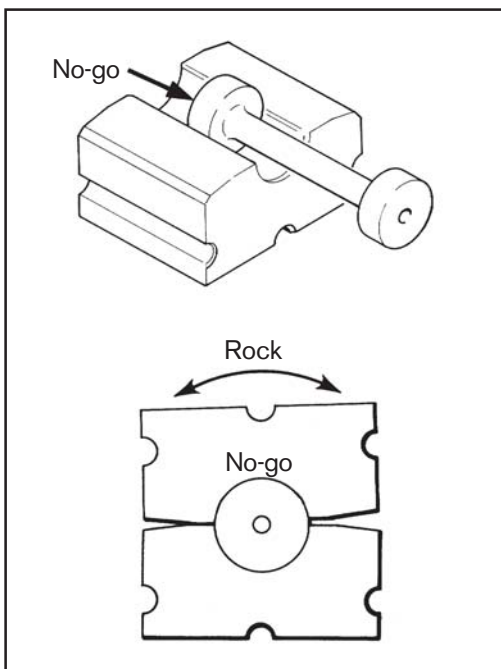
Peened edges will keep the die gauges from seating properly in the dies. To correct, carefully grind away the peened edges of the dies.\* Do not attempt other grinding or machining of the dies.



### Insert “Go” End of Gauge

Insert the smaller “Go” end of the gauge at various locations along the die’s bottom channel. At each location place the top half of the die onto the gauge. The two die halves should come into flush contact with each other and there should be no “rock”. A small amount of pressure on the top half may be necessary to bring the die halves into flush contact. With this technique accurate “Go” readings (no rock) should be obtained.

**Note:** Some die gauges do not have “Go” ends.



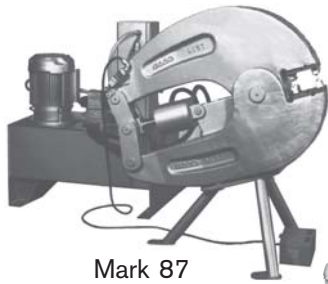
### Insert “No-Go” End of Gauge

Insert the larger “No-Go” end of gauge into various locations along the bottom channel. Then place the top die half onto the gauge. The two die halves must not come in flush contact with each other or the channel is too large. The dies should “rock” slightly in all locations on the “no-go” gauge.

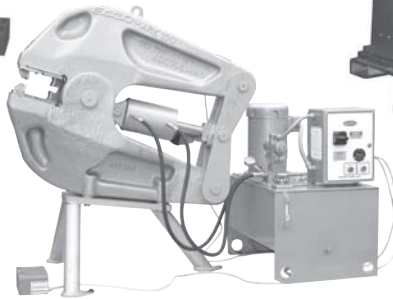
\*When using the No-Go gauge be sure the gauge lies in the bottom of the cavity. If the edges of the dies are peened or the channels are dirty, the gauge will not sit on the bottom of the cavity. This will give a false reading that the dies are good.

**Note:** If the two halves do not “rock” on the “no-go” gauge, the channel has worn beyond tolerances and must be replaced.

# ESCO® Swagers and Accessories



Mark 87



Mark 100



Mark 150



Mark 250

Swager and Fitting Capacities																							
ESCO Swagers		Fitting																					
		Rope Diameter (inches)																					
		1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1-1/8	1-1/4	1-3/8	1-1/2	1-5/8	1-3/4	2	2-1/4	2-1/2	
SS 1-P.c. (Duplex)	Mark 75/87																						
	Mark 100																						
	Mark 150, 200, 250																						
SS 2-P.c. (Duplex)	Mark 75																						
	Mark 87																						
	Mark 100																						
	Mark 150																						
	Mark 200																						
	Mark 250																						
SS Single (Flemish)	Mark 75/87																						
	Mark 100																						
	Mark 150																						
	Mark 200																		*				
	Mark 250																		*				
Carbon (Flemish)	Mark 75/87																						
	Mark 100																						
	Mark 150																						
	Mark 200																		*				
	Mark 250																		*			*	
Ferrules	M K 75 (MIDGT)/87																						
	M K 100(DWARF AND BANTAM)																						
	M K 150,200, 250 (LIGHT AND JUNIOR)																						
Sockets	Mark 75/87																						
	Mark 100																						
	Mark 150																						
	Mark 200																		*				
	Mark 250																		*				

**Note:** Mark 87 supersedes the Mark 75. The Mark 200 is no longer in production.

## ESCO® Swagers and Accessories



### Making a Strong Grommet

Many riggers have their own methods of making these utility wire rope assemblies, and it seems there is no uniform agreement on the best method.

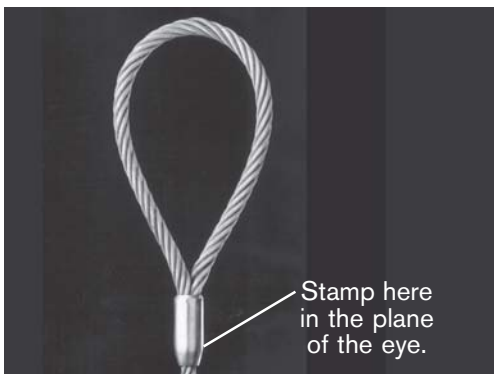
To determine for ourselves which way was best, we made grommets with various sleeve arrangements and then subjected them to pull tests.

According to our tests, the best results were achieved when we swaged three two-piece ESCO duplex sleeves onto the wire rope spaced two to three sleeve lengths apart.

We also achieved good results using two one-piece ESCO duplex sleeves, spaced two to three sleeve lengths apart.

We hope this information is helpful to you in making these difficult wire rope assemblies. However, it is based only on our own test results. You should continue to follow your own testing procedures to make sure your grommets and other assemblies perform to your expected performance levels.

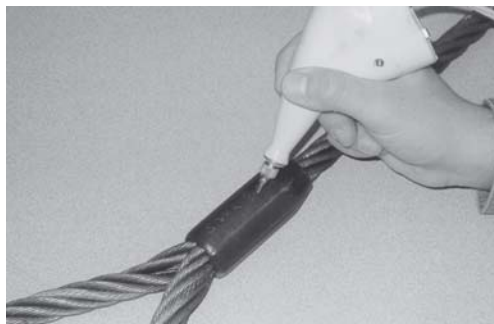
Remember that all ESCO sleeves should be properly swaged according to the instructions in this manual.



### Marking Fittings After Swaging

**ESCO carbon steel sleeves can be impression stamped after swaging for purposes of identification.**

When properly done, there should be no concern for the possibility of fractures initiating from such impressions. When impression stamping ESCO carbon steel sleeves, use **round corner** or **dot design**, low stress stamps to a **maximum** depth of .015 inch. The area for stamping should be on the side of the sleeve in the plane of the sling eye and more than .250 inch from either end of the sleeve.



**An effective way to mark your slings and other rigging assemblies is by engraving them with an electric vibrating pencil.**

Engraving pencils are available at local hardware stores. The technique is simple to use, easy to apply, and is permanent.

You can safely "write" identifying information (working load, your shop name, swage press operator's initials, etc.) on stainless steel and aluminum sleeves as well as on carbon steel sleeves. You can also use this technique on swage sockets. Tests show that the strength of the rigging is unaffected by this type of engraved marking.

To make your markings even easier to read, apply bluing dye on the fitting before engraving.









**Rigging Nationwide Sales & Service**

Phone: 1-800-227-3726 • FAX: 1-800-344-8635

**Corporate Business Office**

2141 N.W. 25th Avenue • Portland, Oregon 97210-2578  
Phone: (503) 228-2141 • FAX: (503) 778-6682

Visit the ESCO Products web site  
[www.escocorp.com](http://www.escocorp.com) or  
[www.riggerschoice.com](http://www.riggerschoice.com)

**1-800-227-3726 USA**

*Contact your ESCO dealer today!*