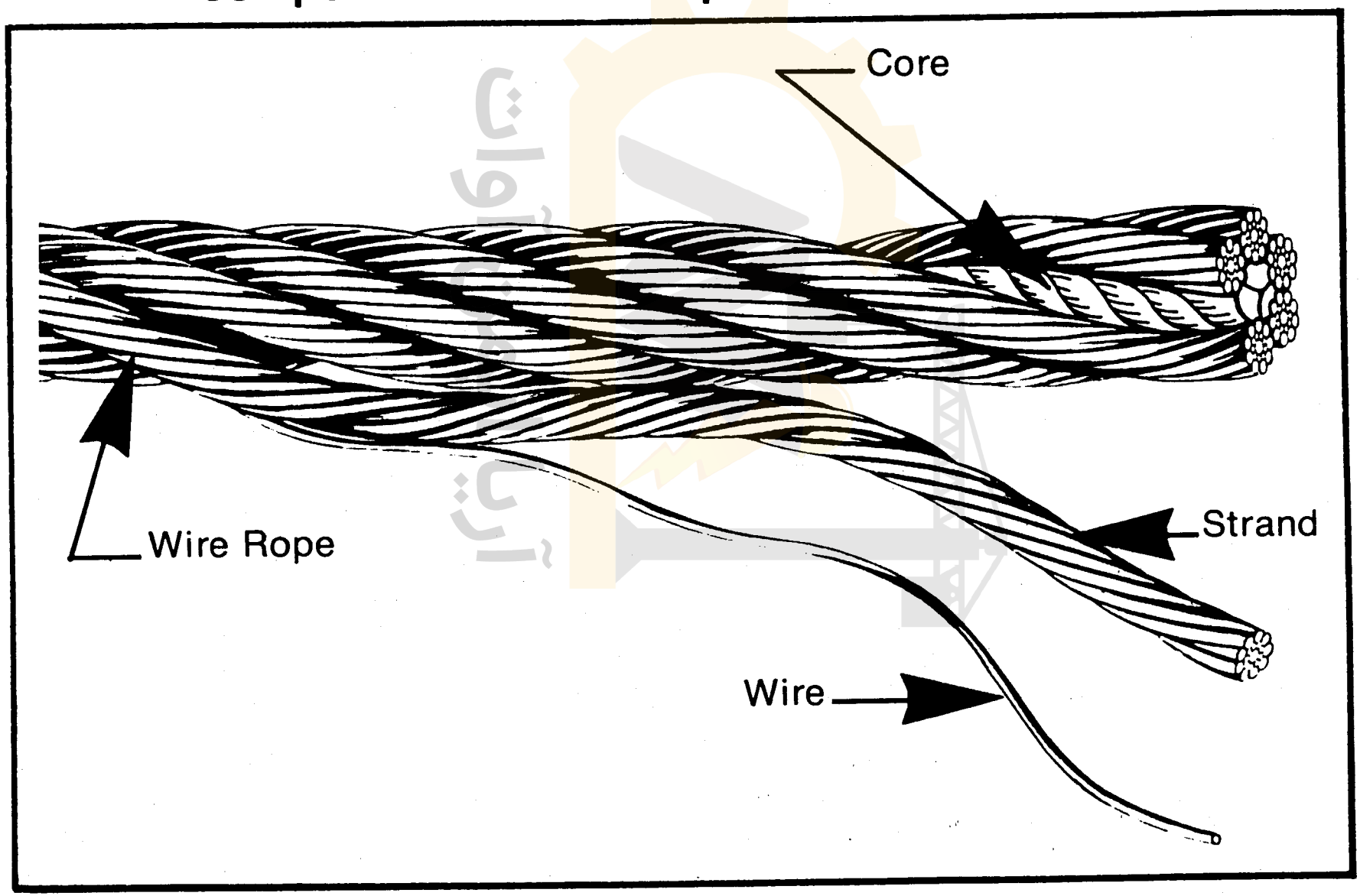
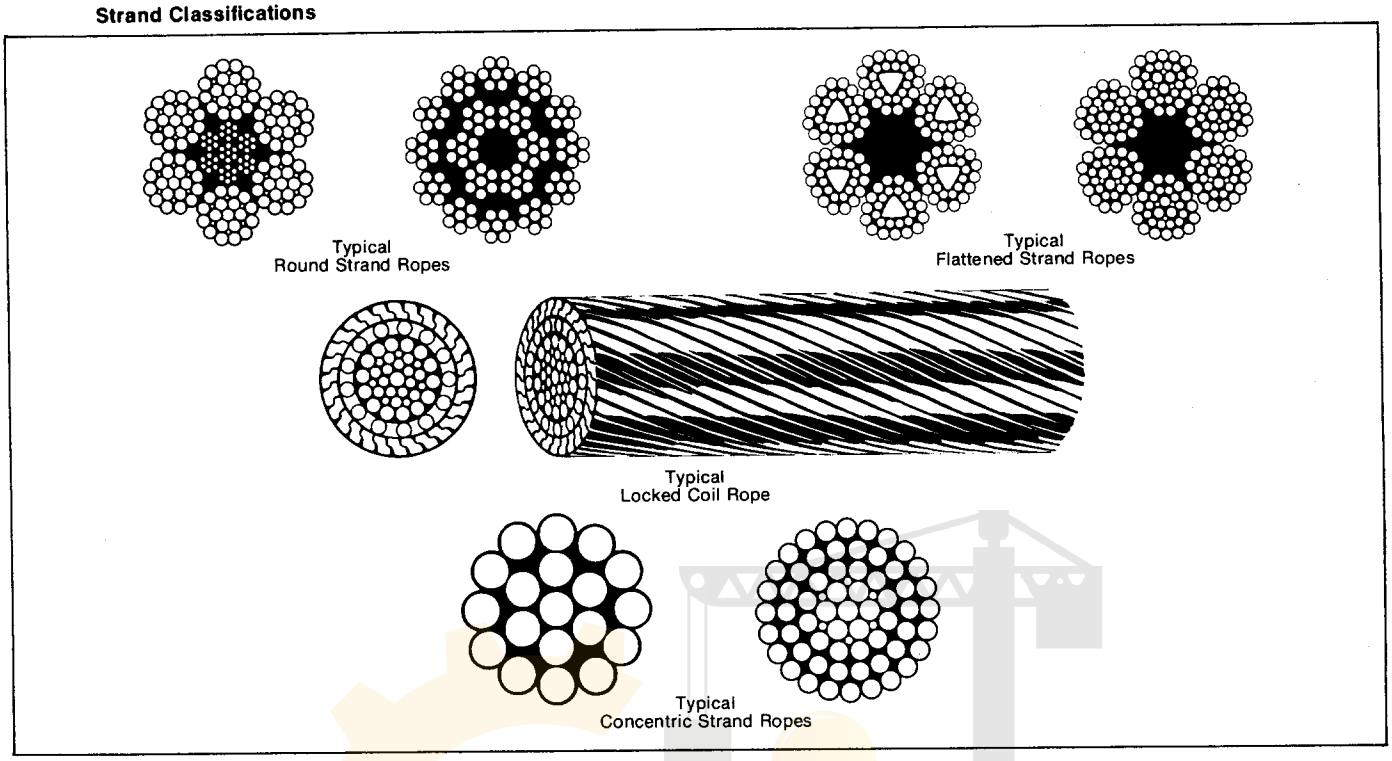
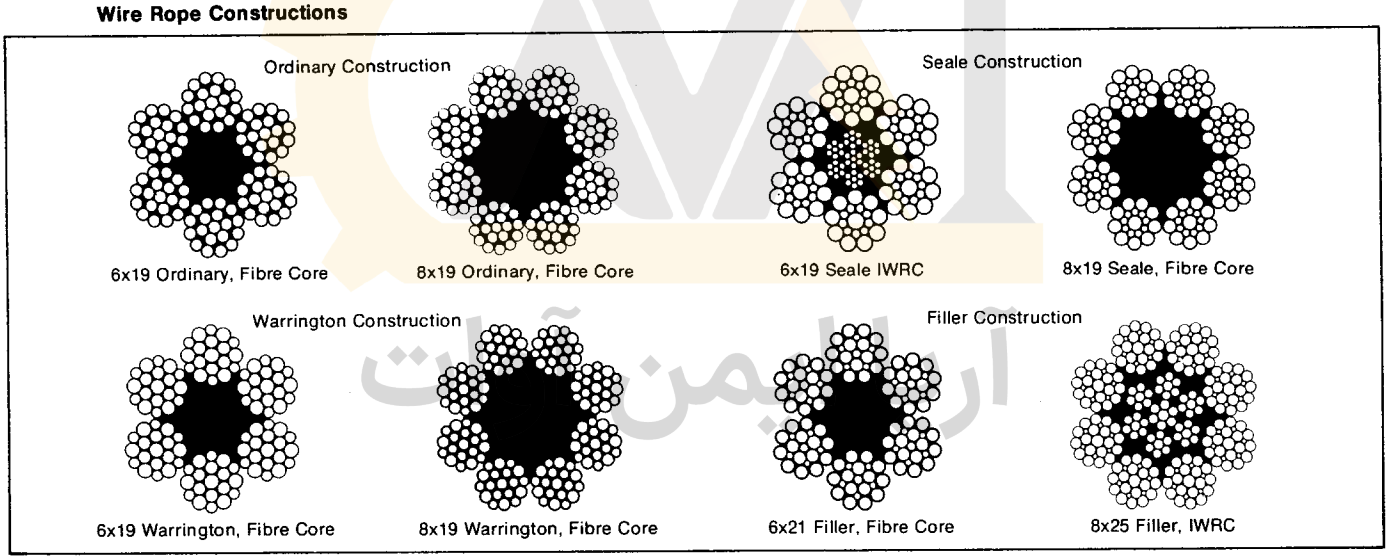
Composition of Wire Rope



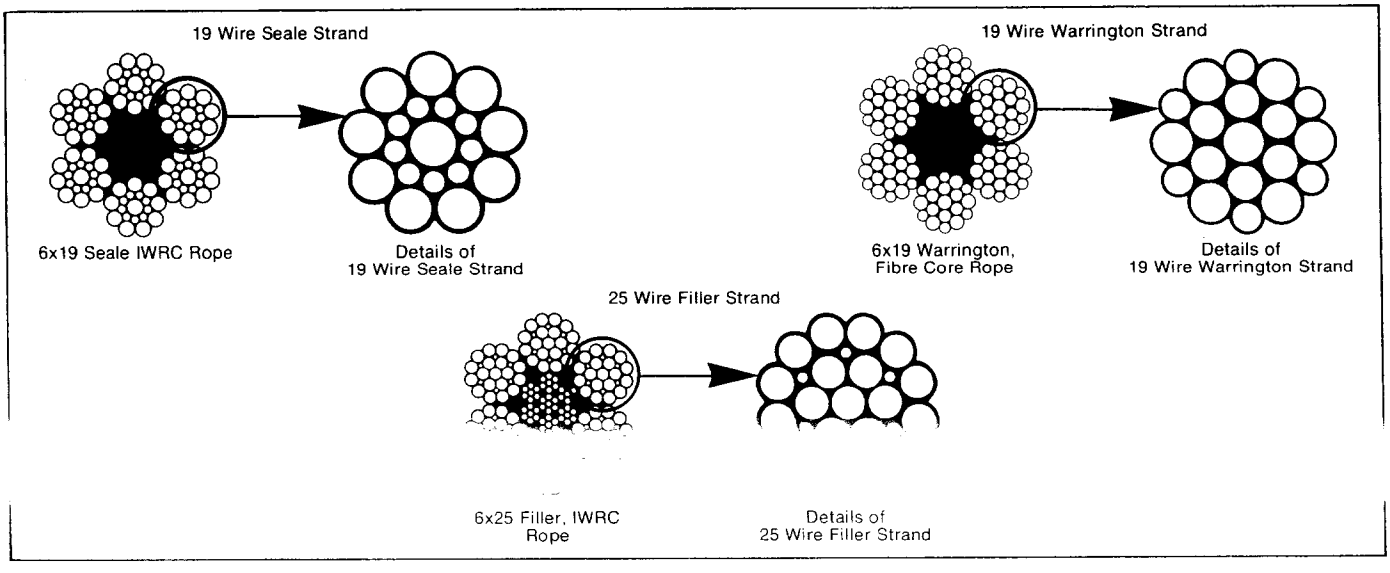
Strand Classifications



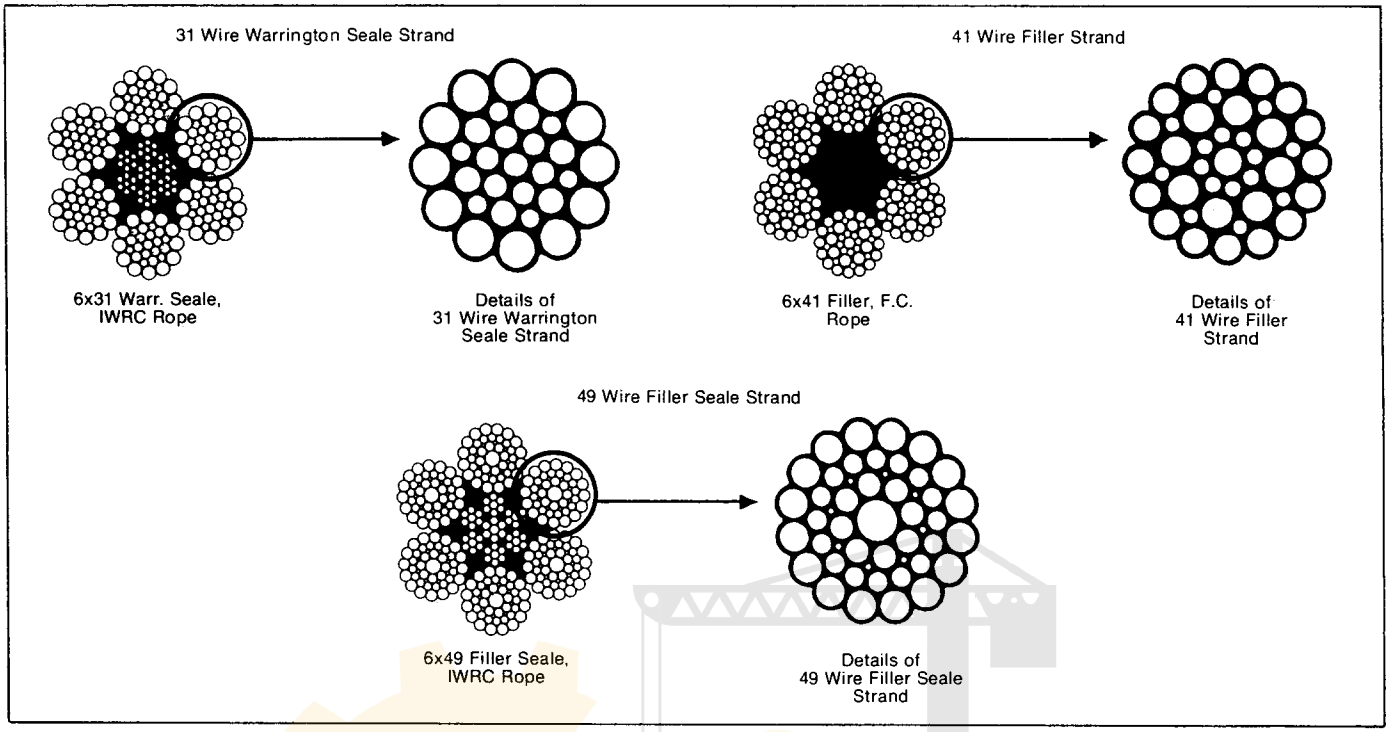
Wire Rope Constructions



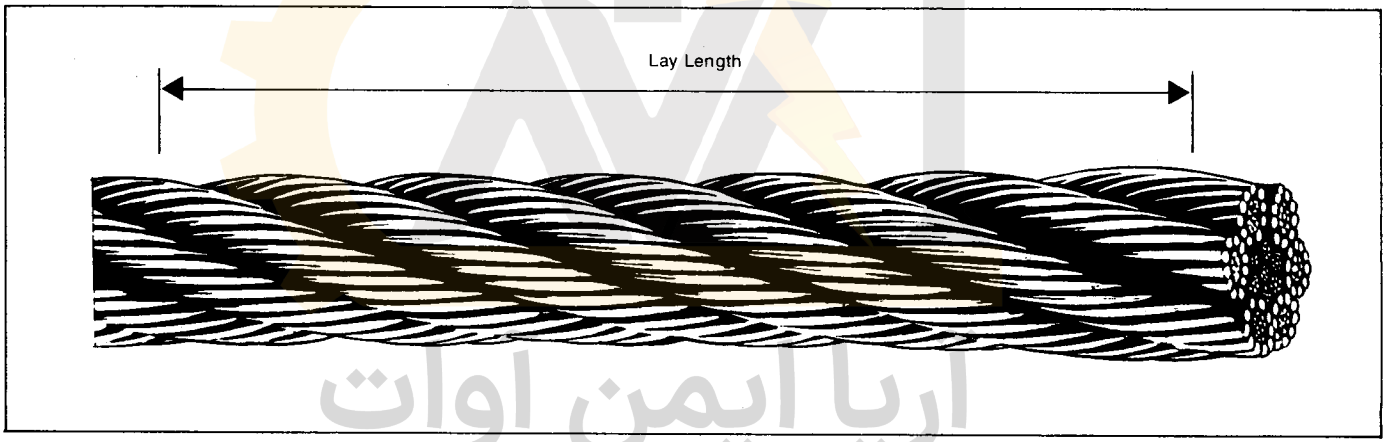
Basic 19 Wire Strand Construction



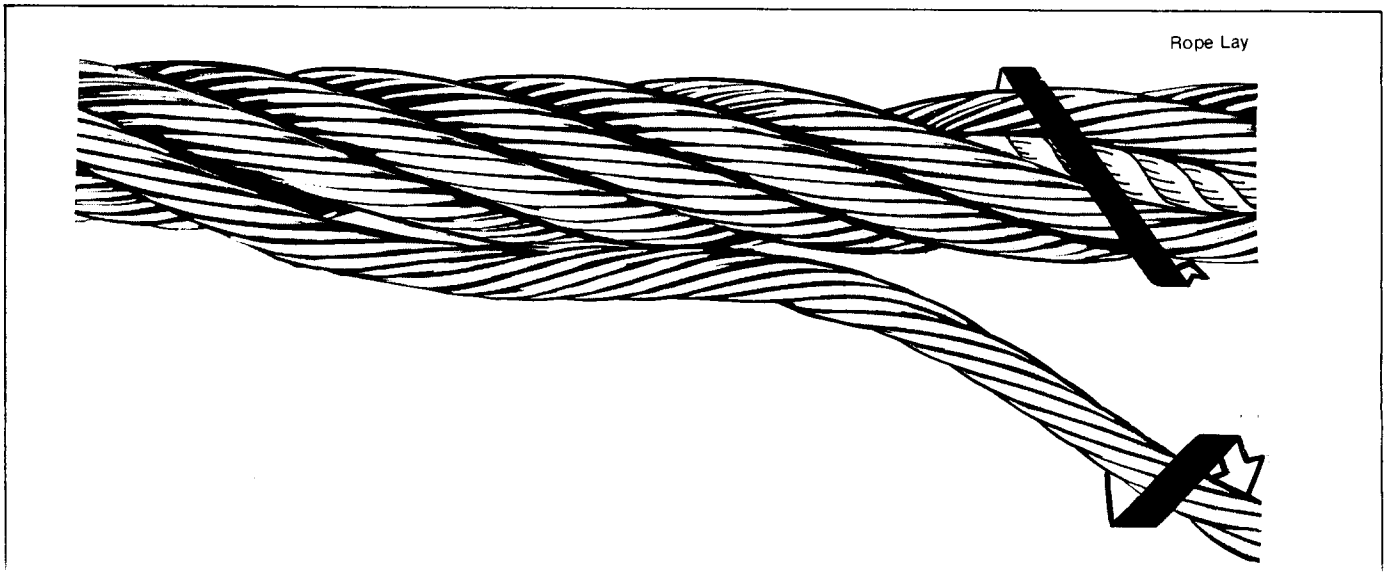
Basic 37 Wire Strands



Measurement of Ropes Lay Length

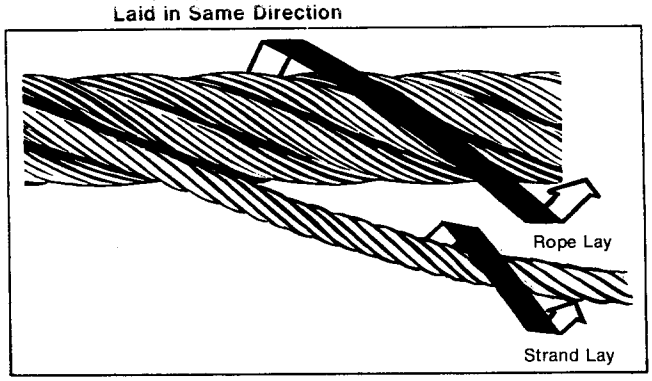


Regular Lay Rope — Wires and Strands Laid in Opposite Directions

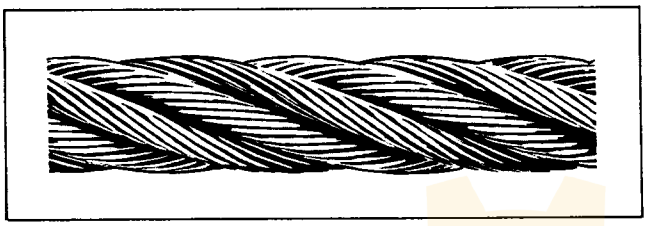


WIRE ROPE

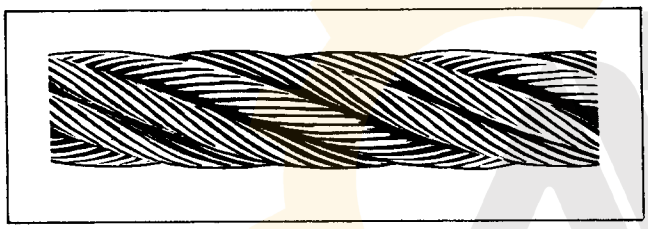
Laid in Same Direction

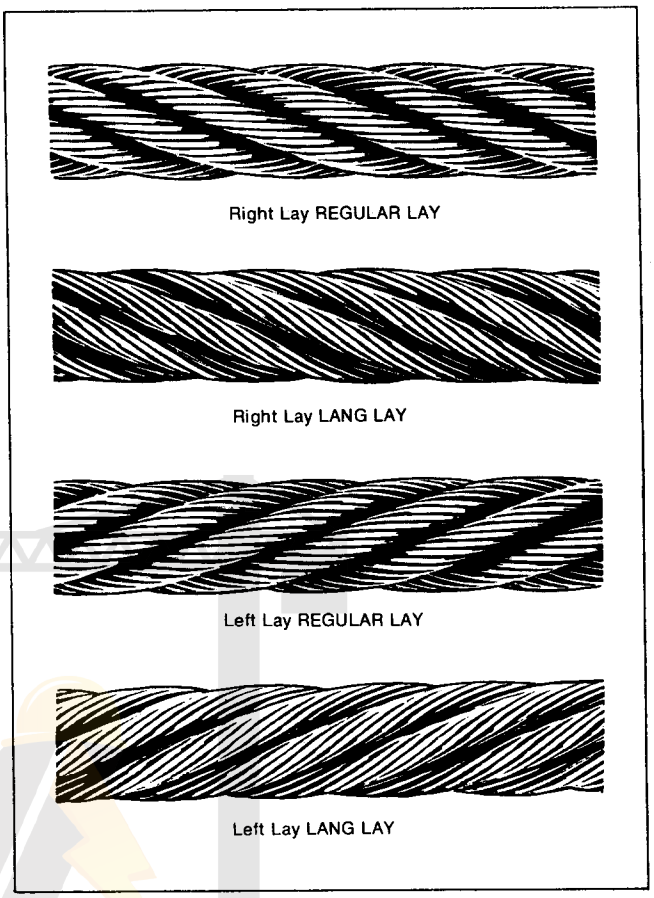


Alternate Lay Rope

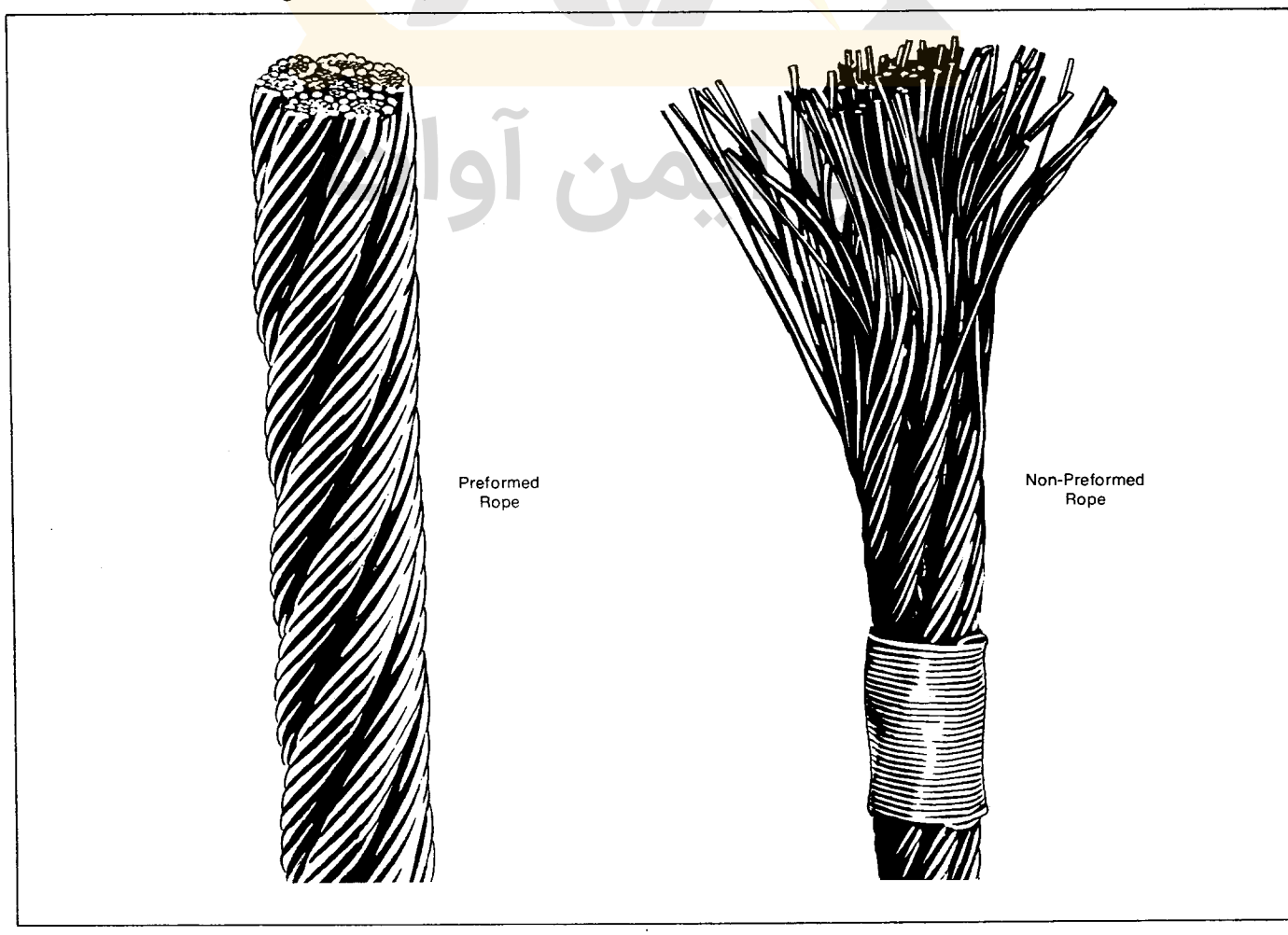


Herringbone or Twin Strand

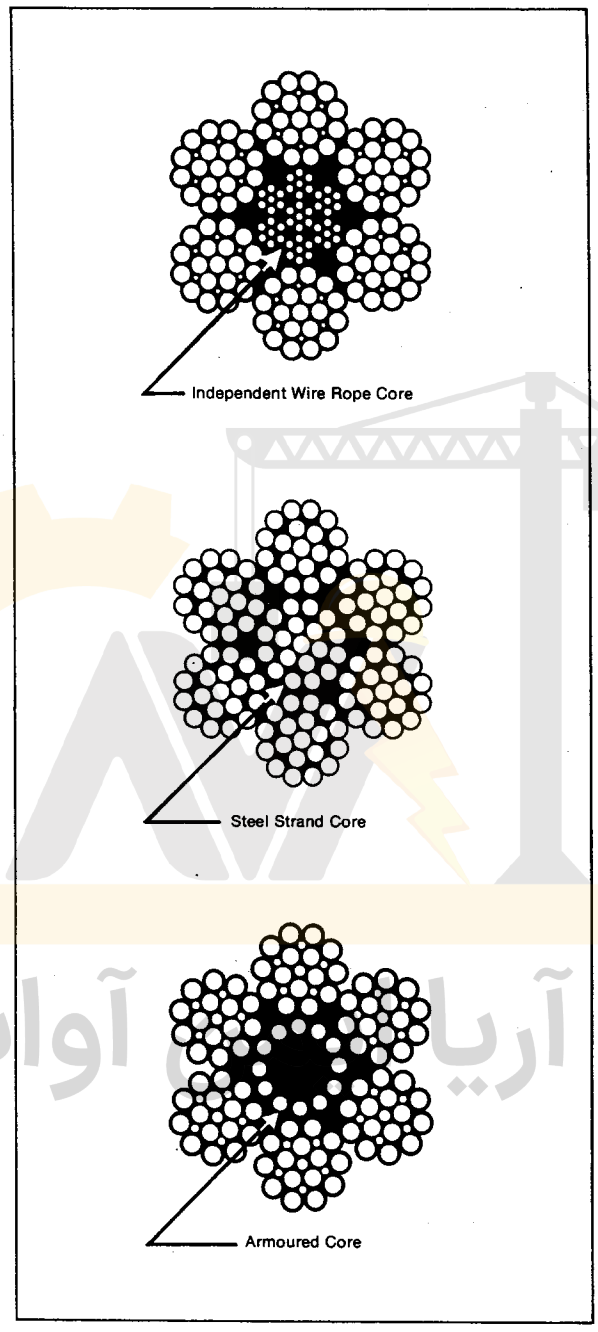




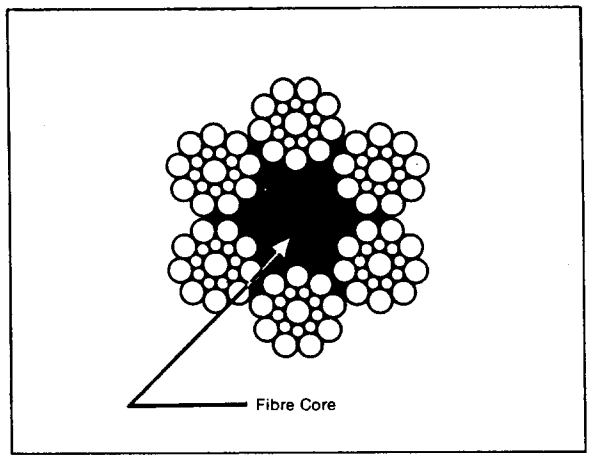
Effect of Preforming on a Wire Rope



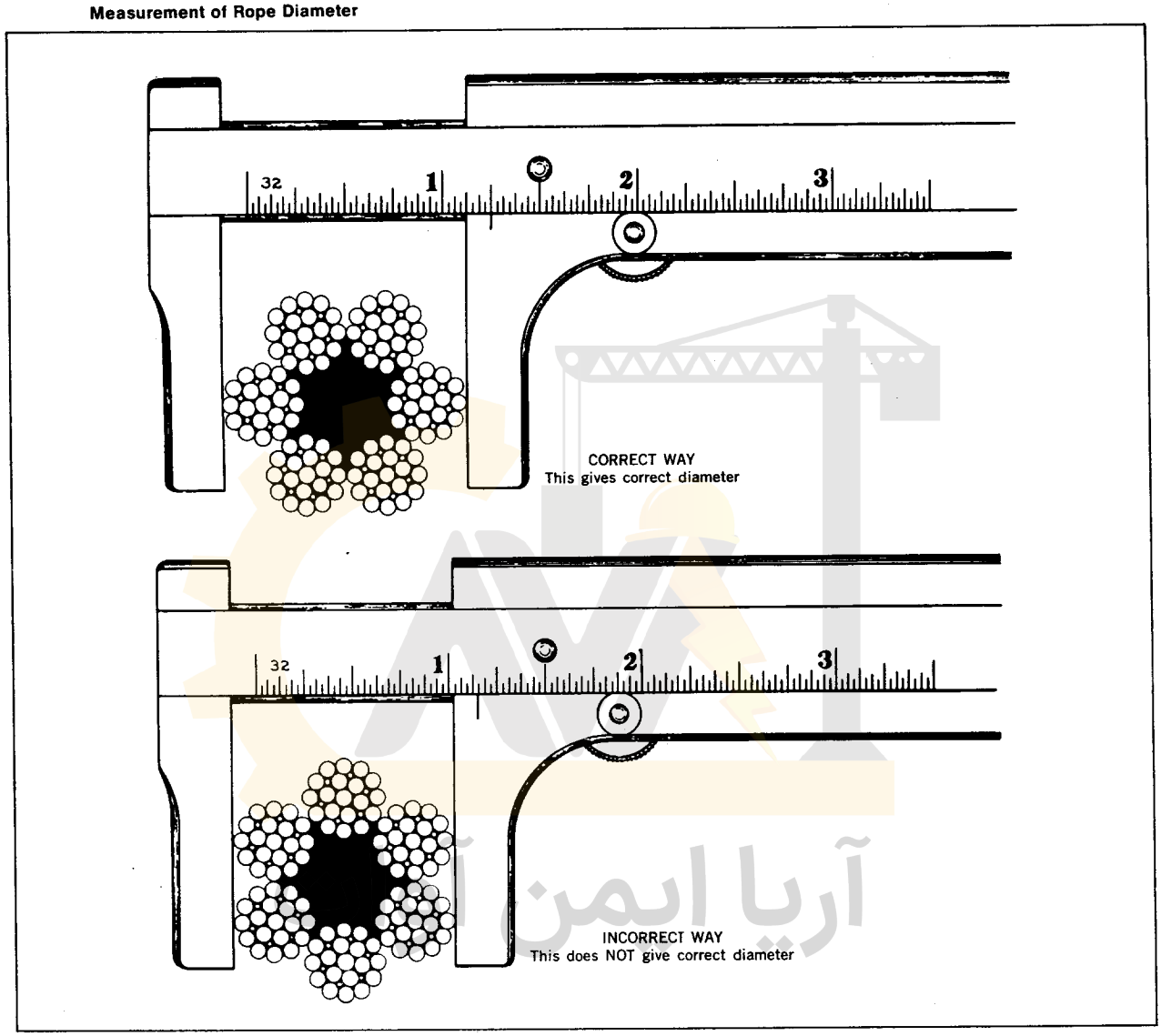
Wire Core Ropes



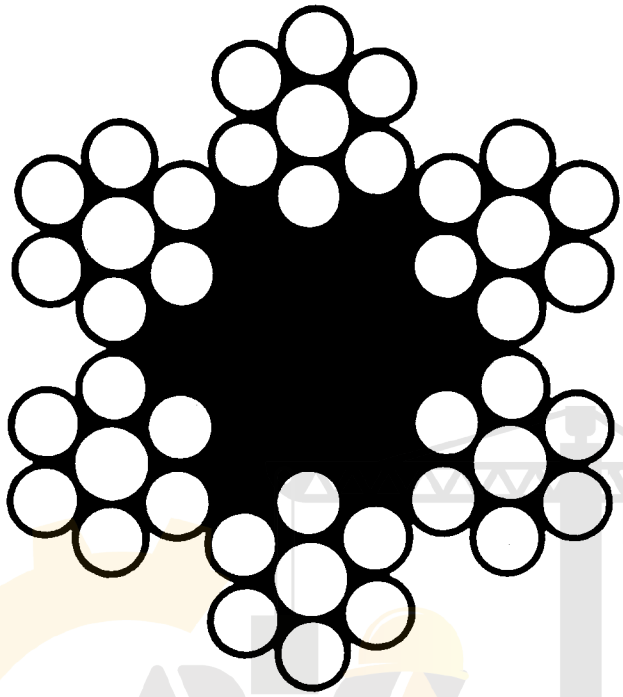
Fibre Core Ropes



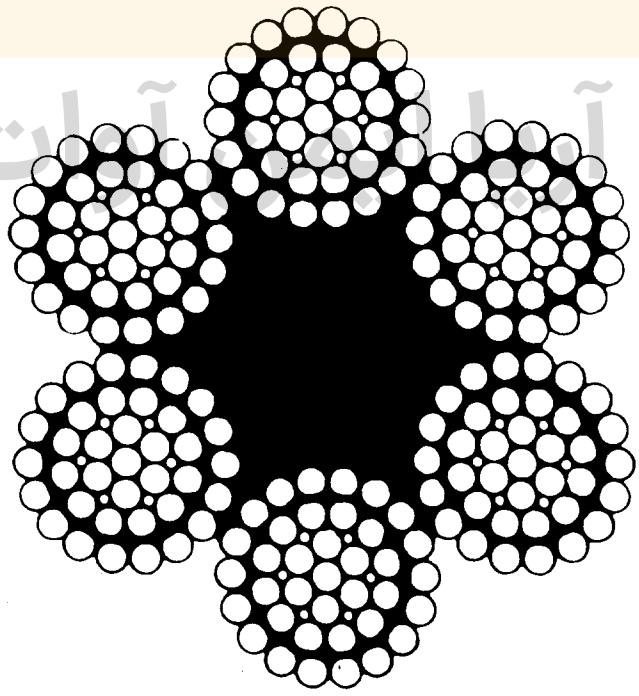
Measurement of Rope Diameter



Effect of Wire Size on Ability to Resist Abrasion, Distortion, Crushing, and Bending Fatigue

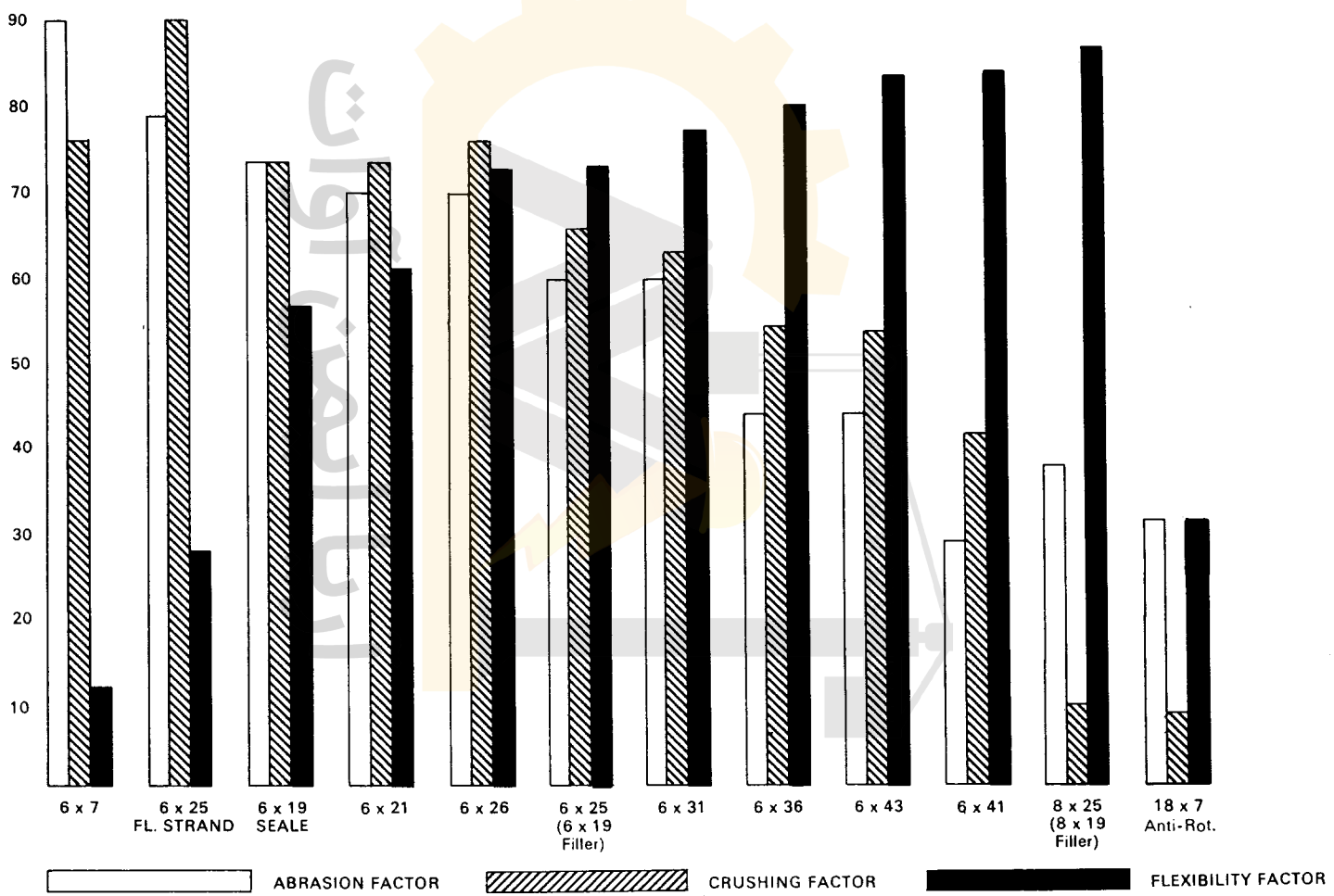


6x7 Fibre Core
Resistant to
Abrasion, Distortion
& Crushing



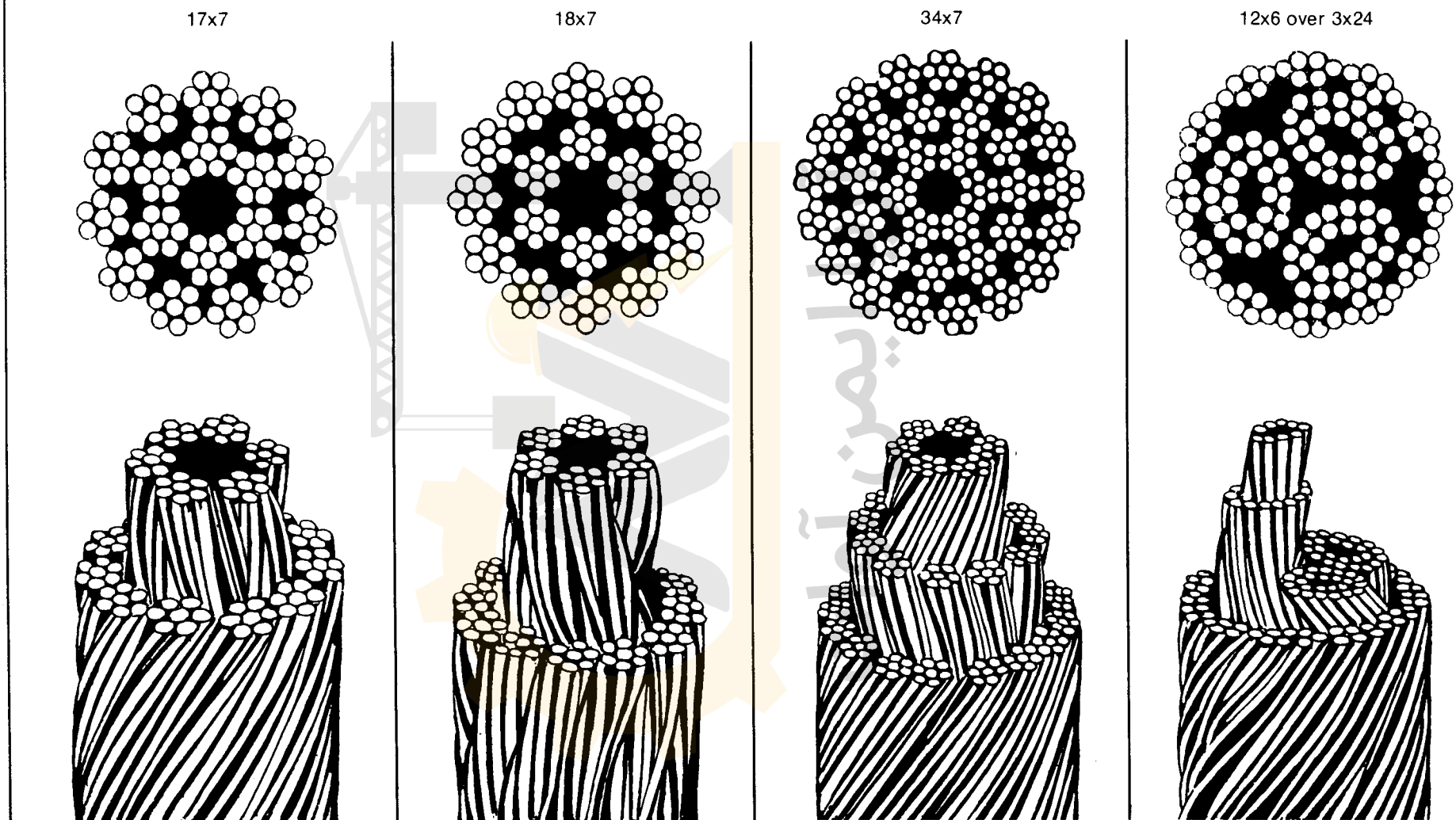
6x43 Filler, Fibre Core
Resistant to
Bending Fatigue

Comparison of Mechanical Properties of Various Ropes

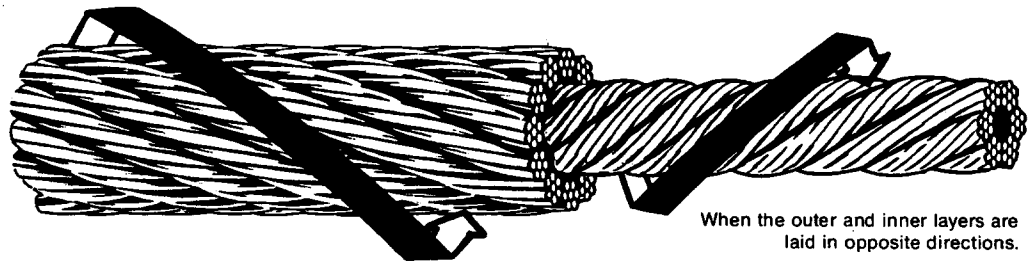


COMPARISON CHART
Abrasion Resistance/Crushing Resistance/Flexibility

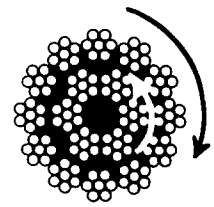
Typical Multi-Strand Non-Rotating Constructions



How the Anti-Rotational Characteristic is Built Into a Non-Rotating Rope

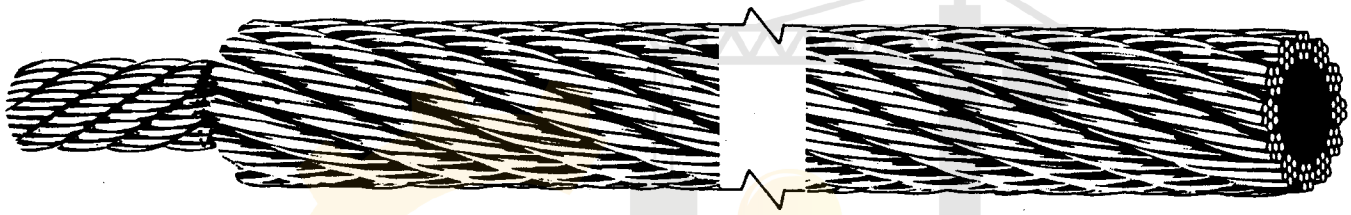


When the outer and inner layers are laid in opposite directions.



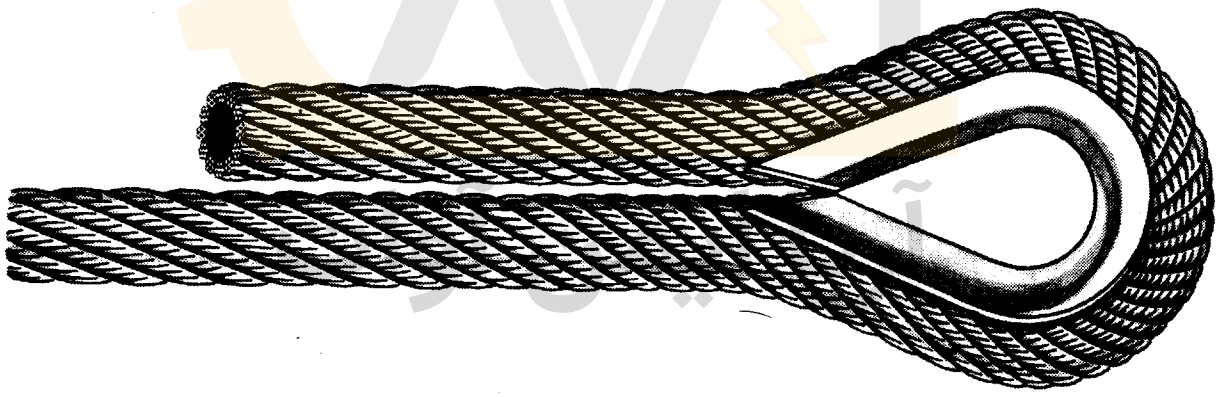
The tendency of outer layer to rotate to the right is balanced by inner layer tending to rotate to the left.

Core Slippage in a Non-Rotating Rope



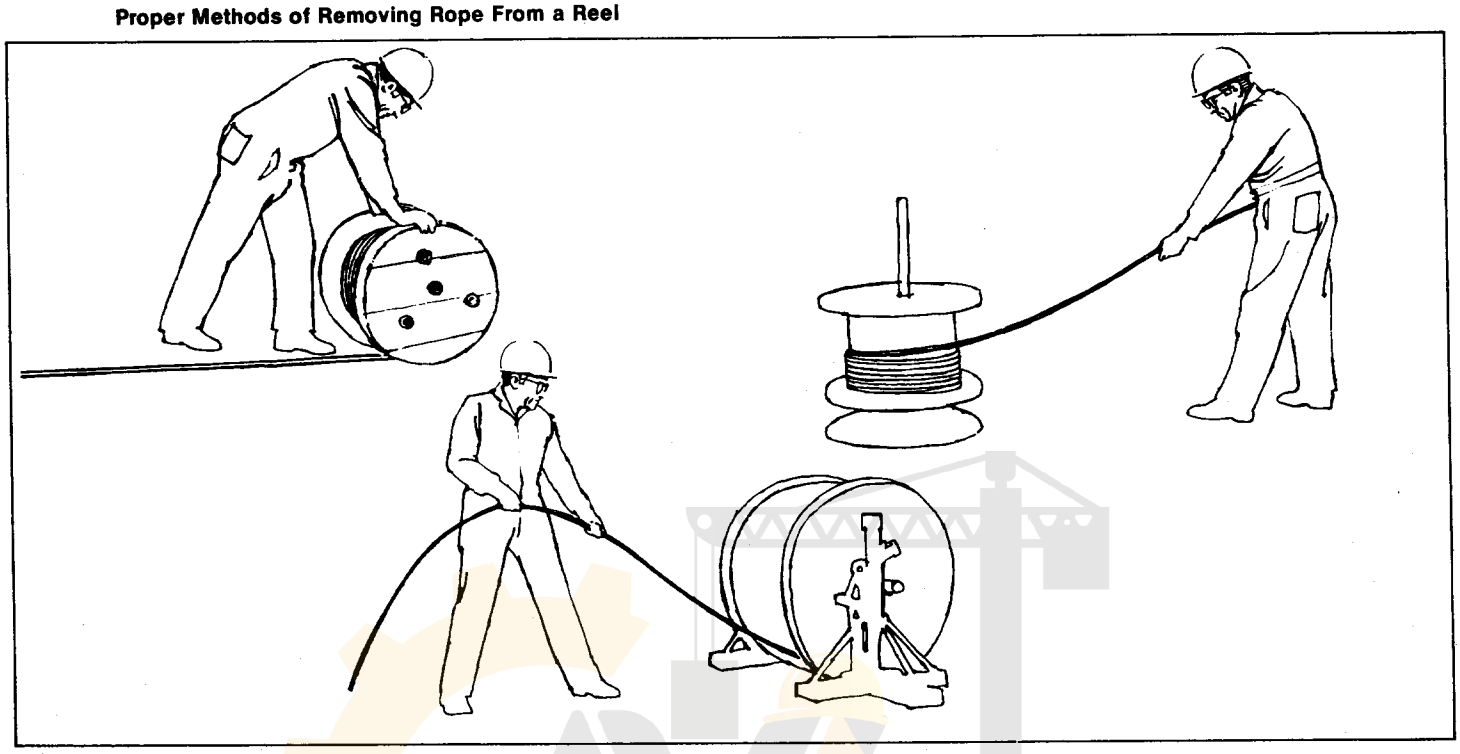
When ends are not properly seized the core can slip and either protrude on the other end or through the outer layer.

Core Slippage in a Non-Rotating Rope



It is possible for core slippage to occur if the thimble is too small or if the rope end is not tightly seized.

Proper Methods of Removing Rope From a Reel



Proper Methods of Removing Rope From a Coil

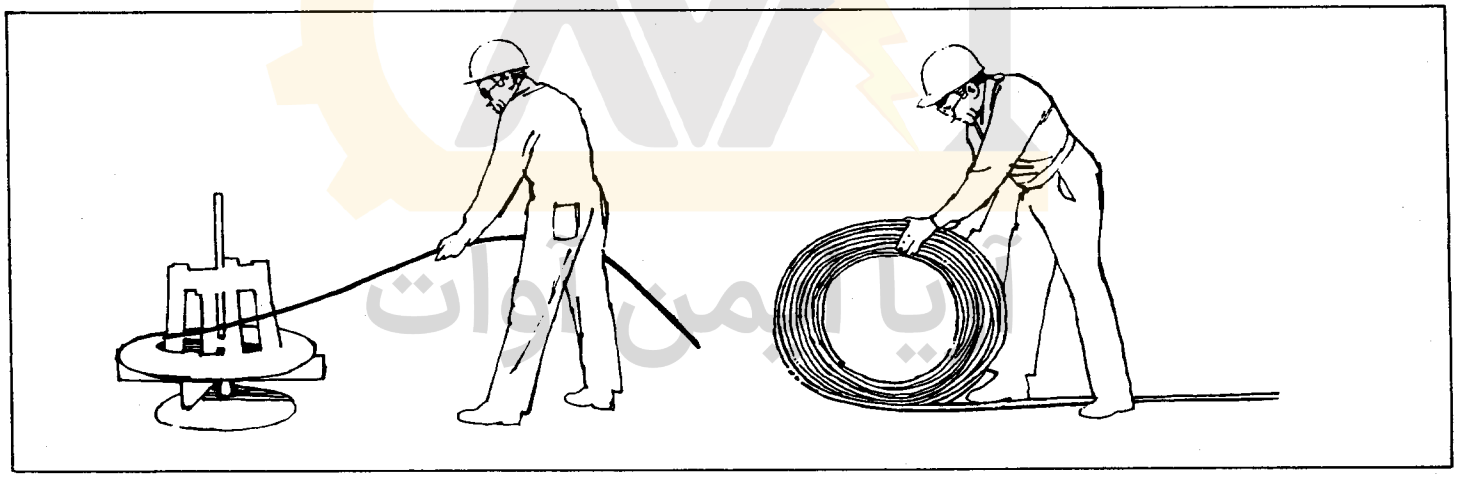
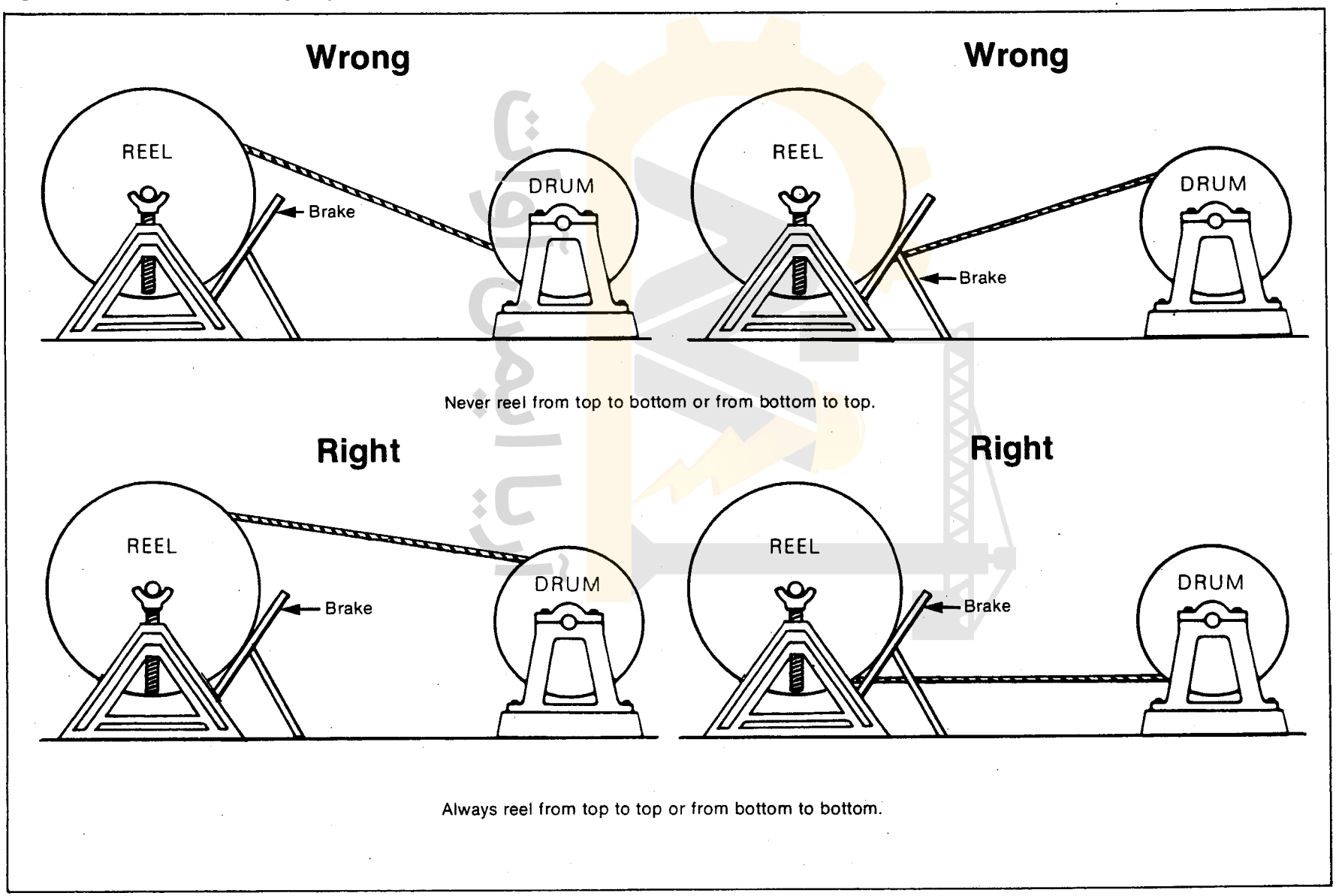
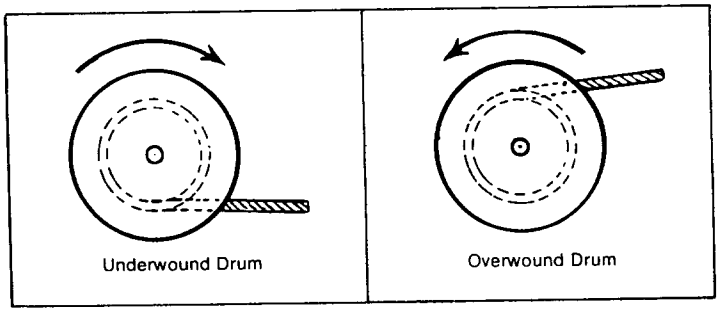


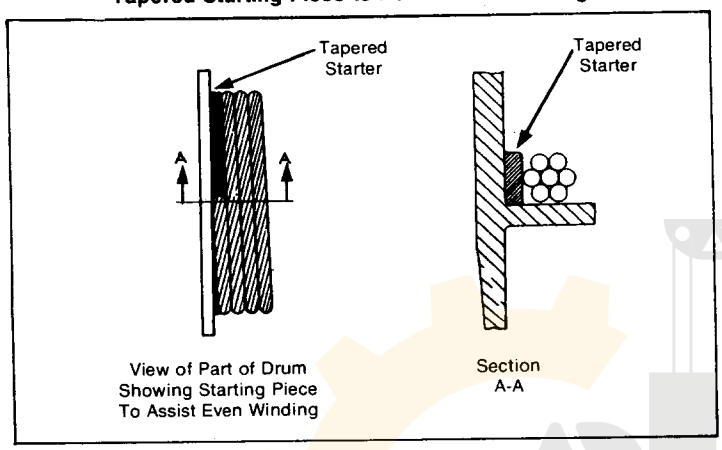
Fig. 1.24 Methods of Winding Rope from Reel to Drum or Reel to Reel



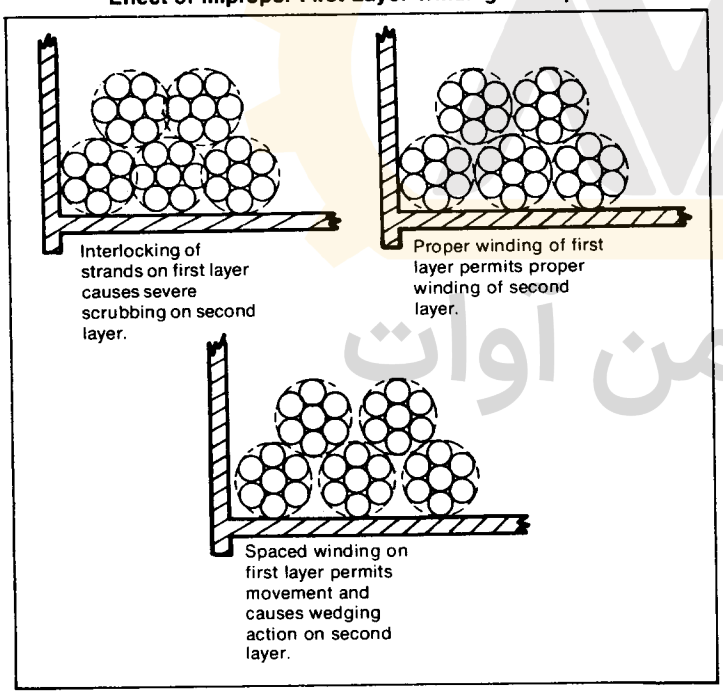
Difference Between Overwound and Underwound Drums



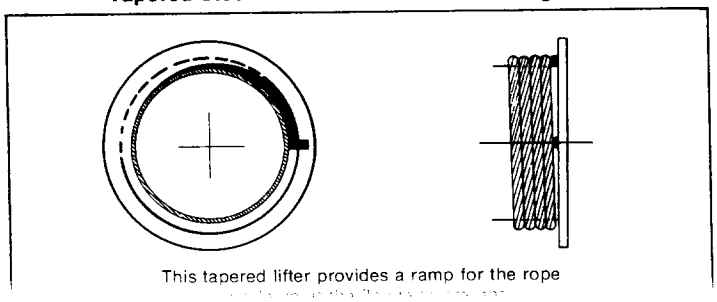
Tapered Starting Piece to Assist Even Winding



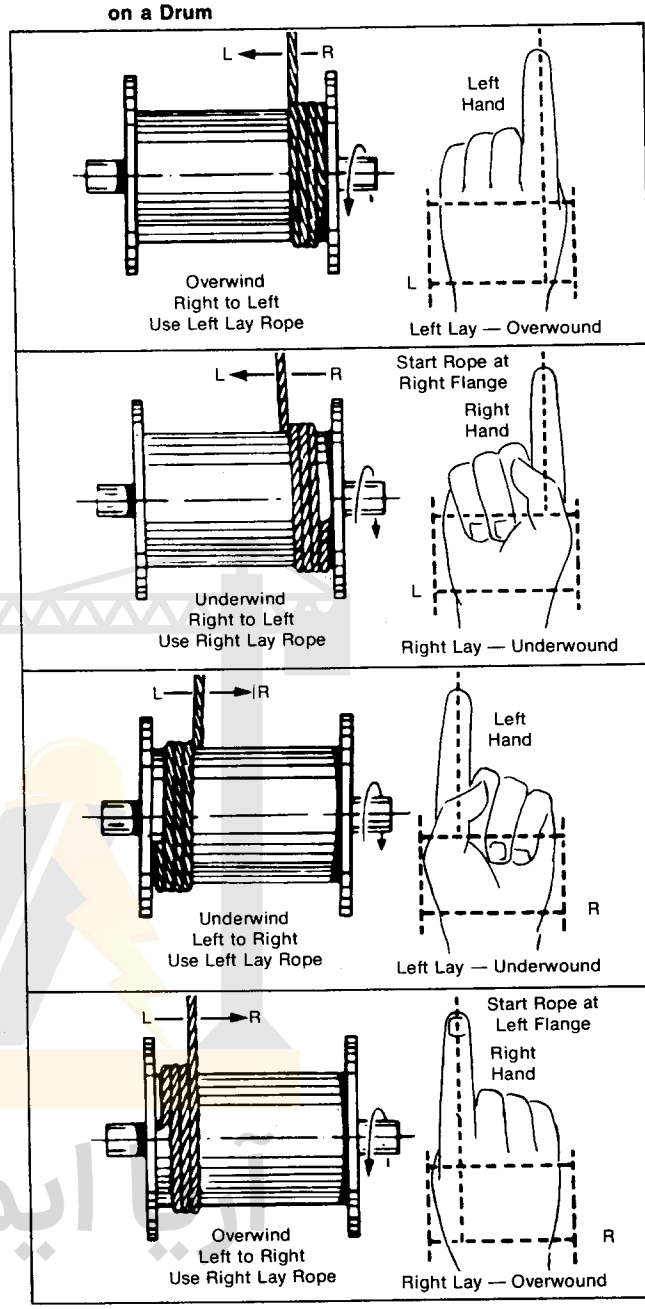
Effect of Improper First Layer Winding on Rope Life



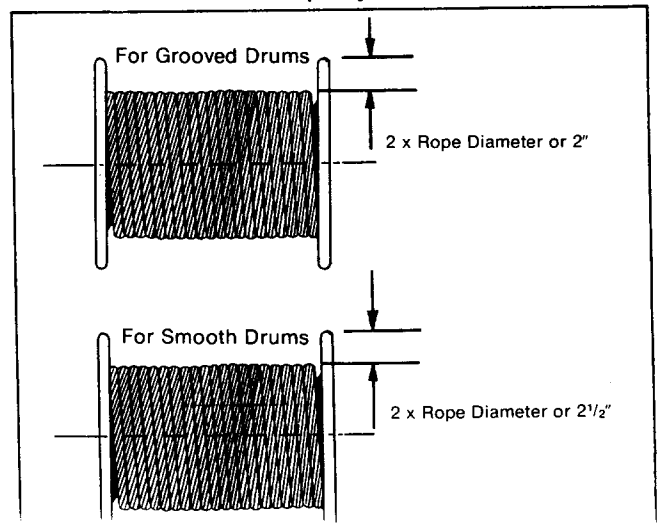
Tapered Steel Lifter to Assist Even Winding



Proper Method of Locating Rope Anchorage Point on a Drum



Maximum Drum Capacity



Matching of Ropes and Sheaves

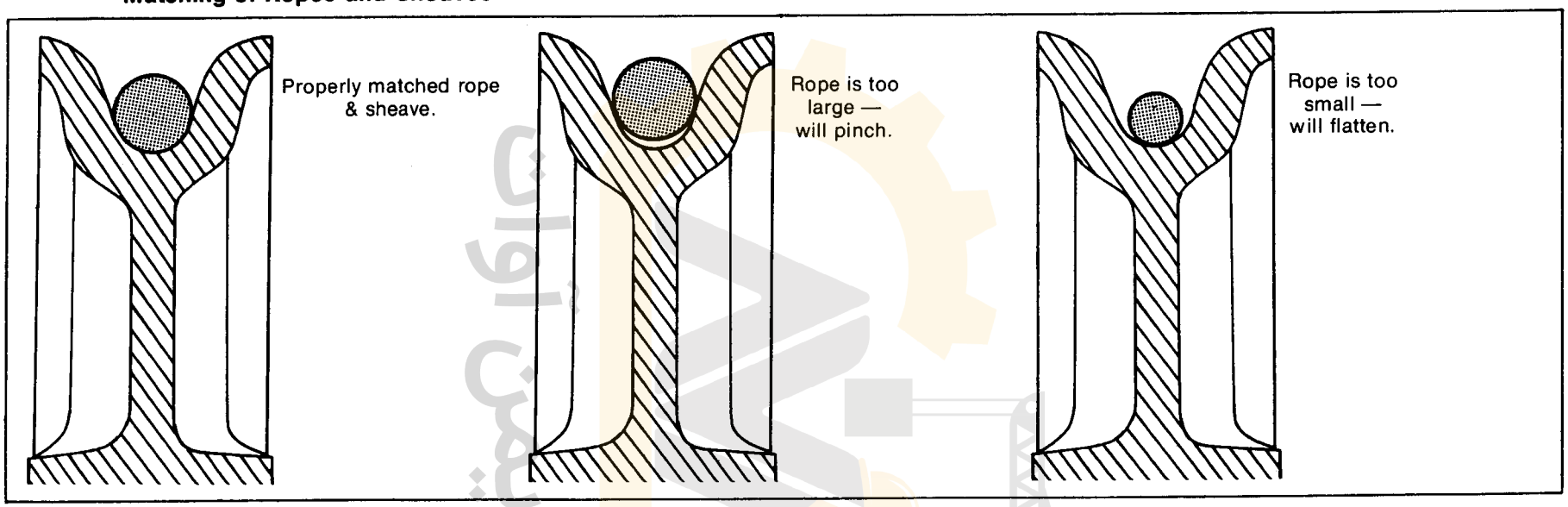
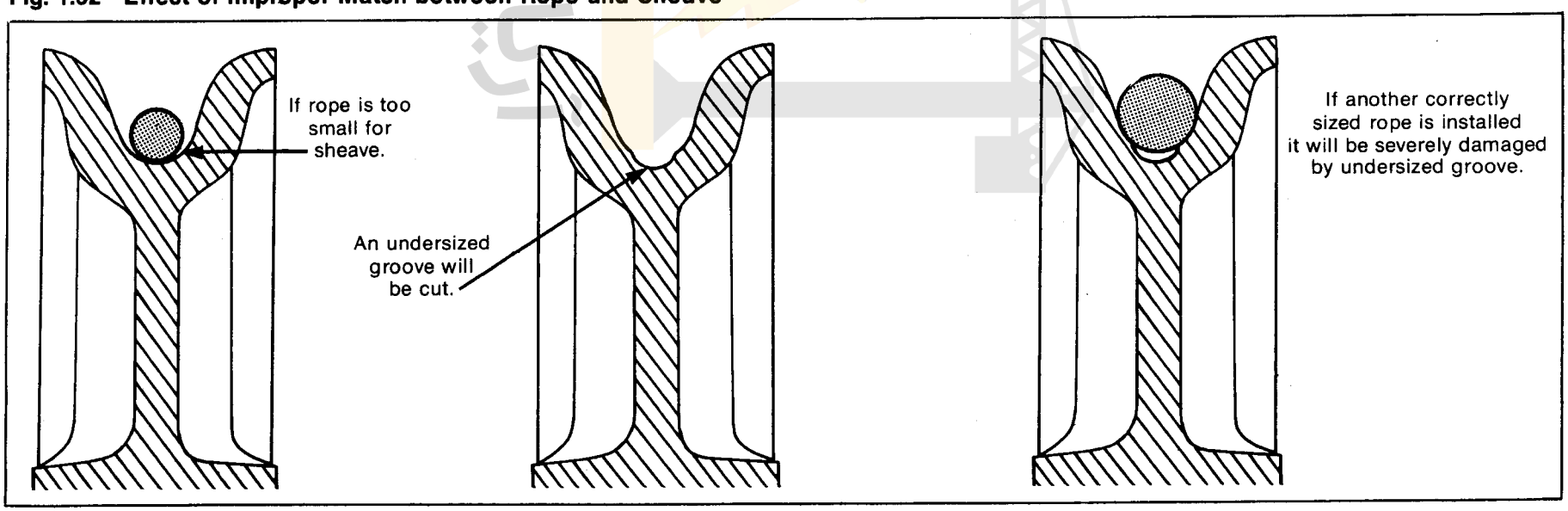
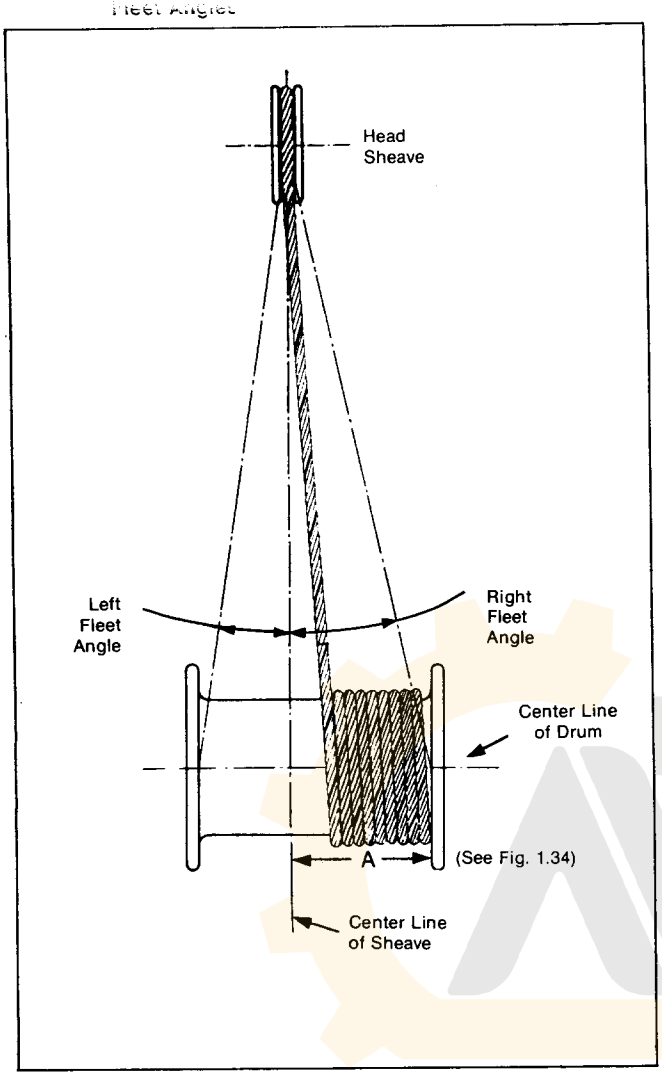


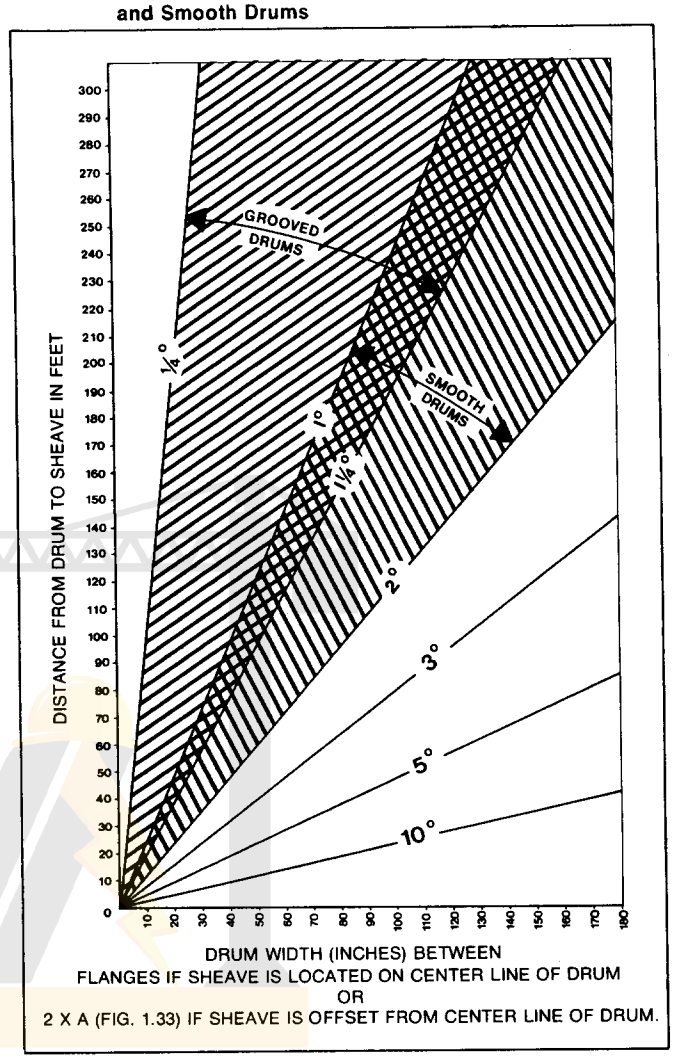
Fig. 1.32 Effect of Improper Match between Rope and Sheave



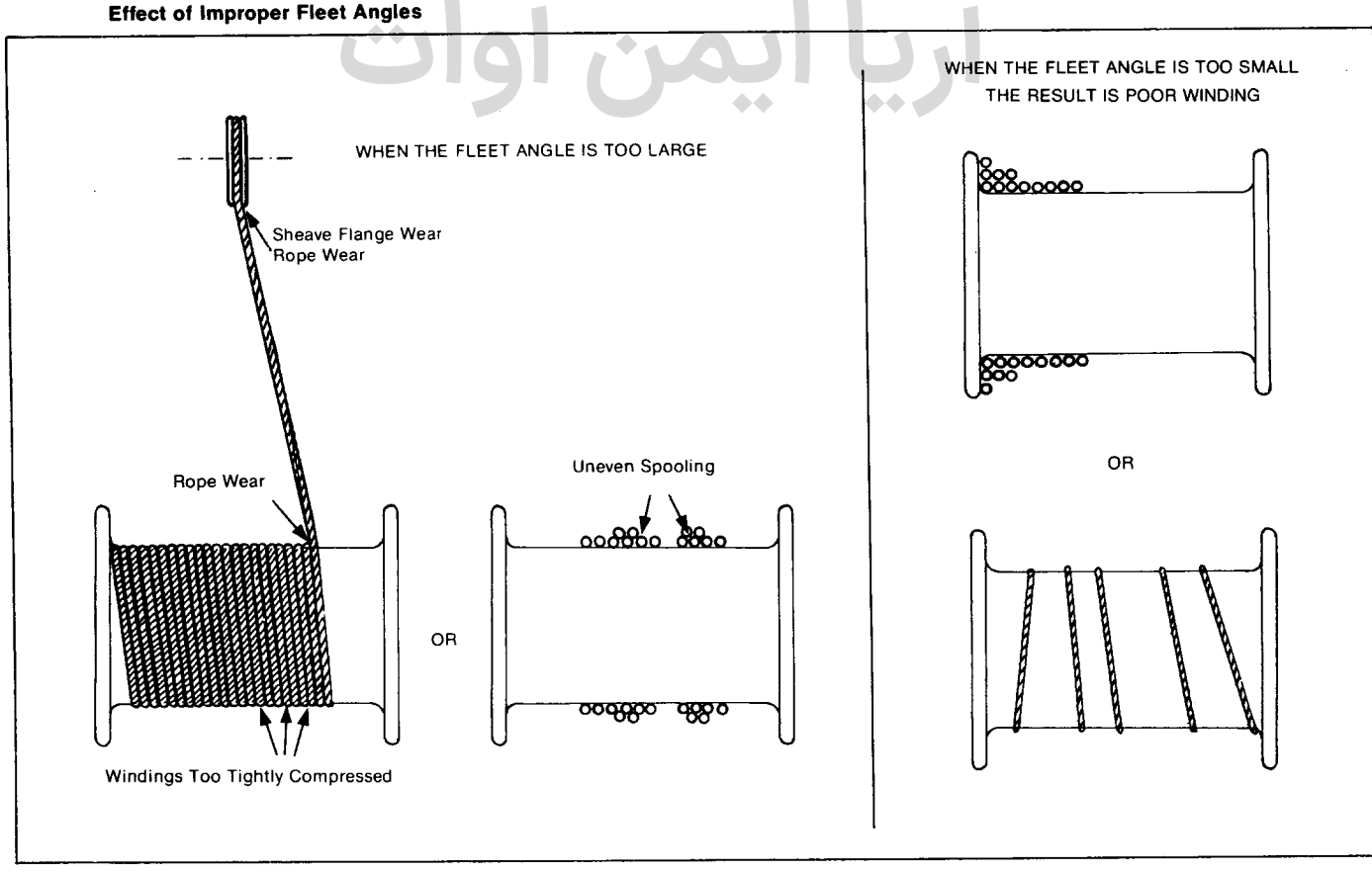
Fleet Angles



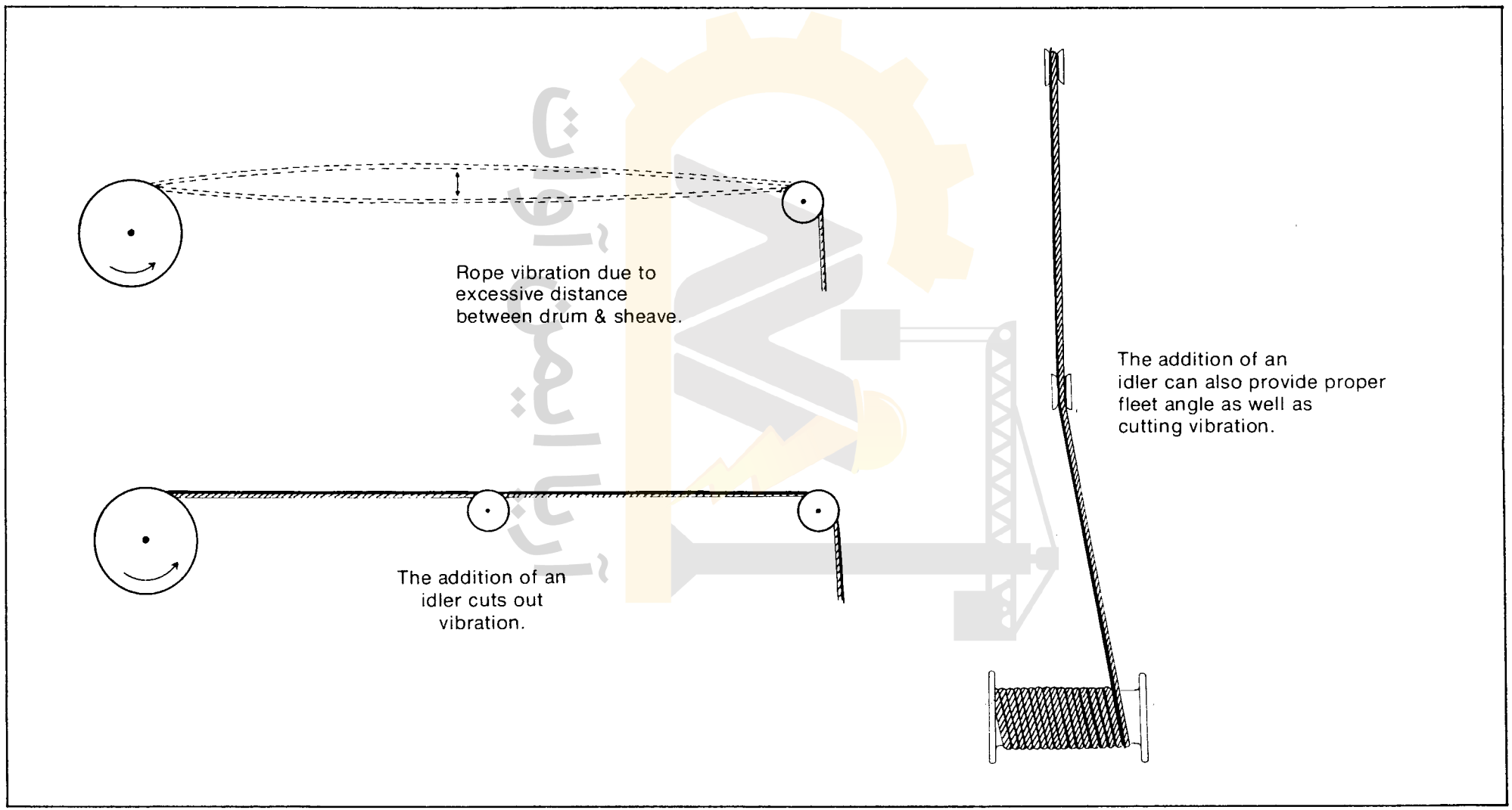
Maximum Fleet Angles for Grooved and Smooth Drums



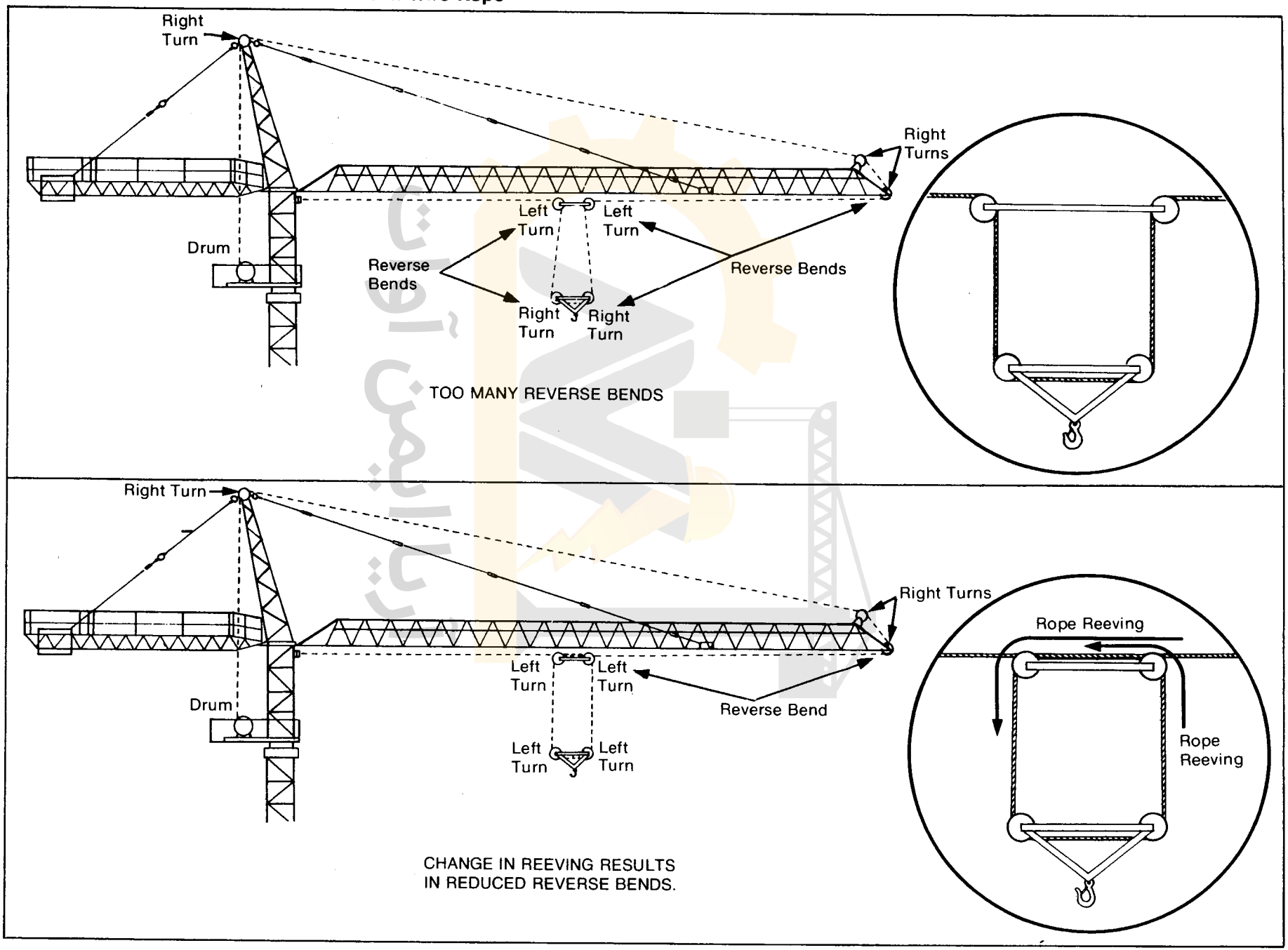
Effect of Improper Fleet Angles



Effect of Excessive Distance between Drum and First Sheave

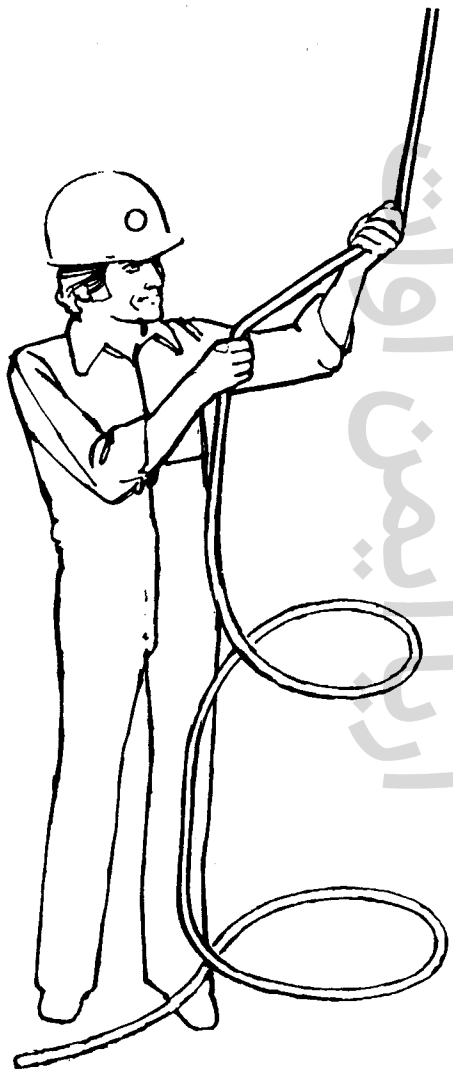


Elimination of Reverse Bends in Wire Rope



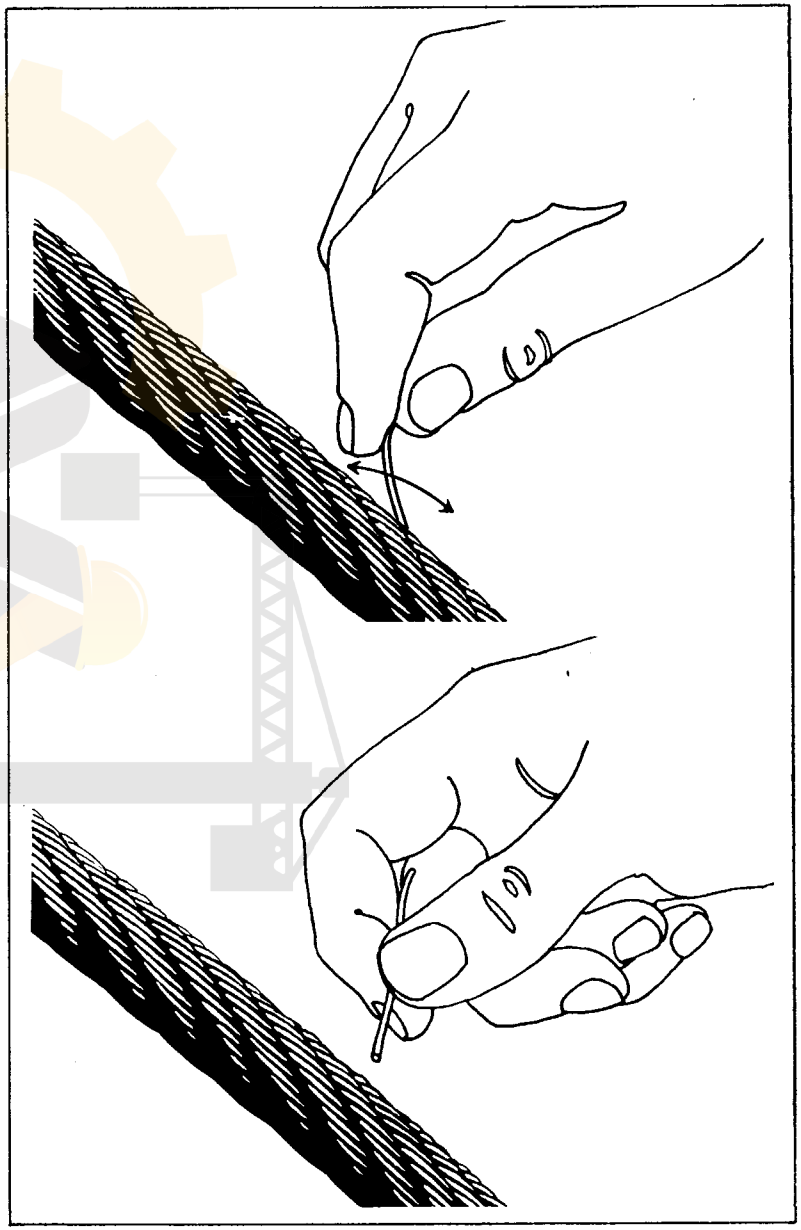
WIRE ROPE

Criteria for Wire Rope Replacement

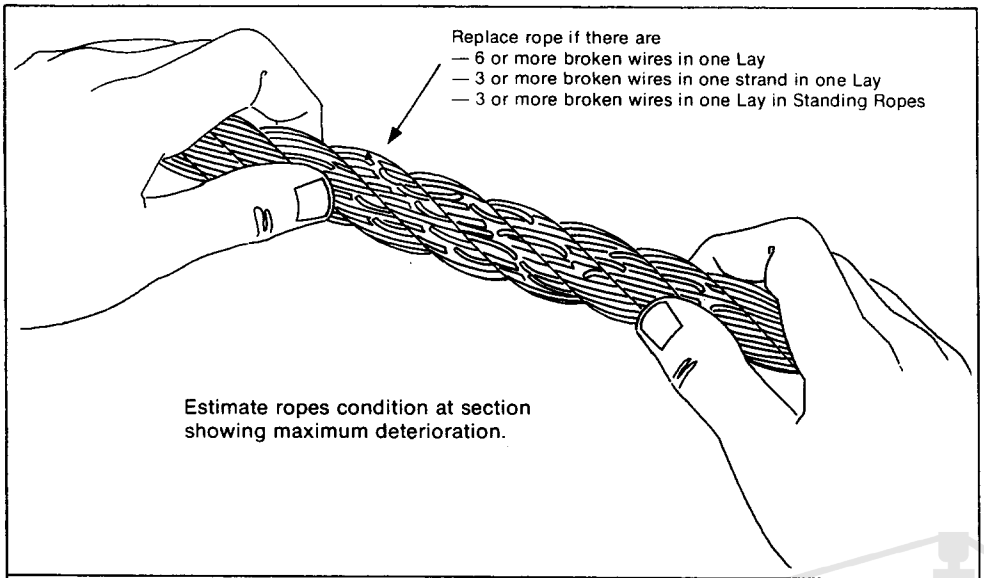


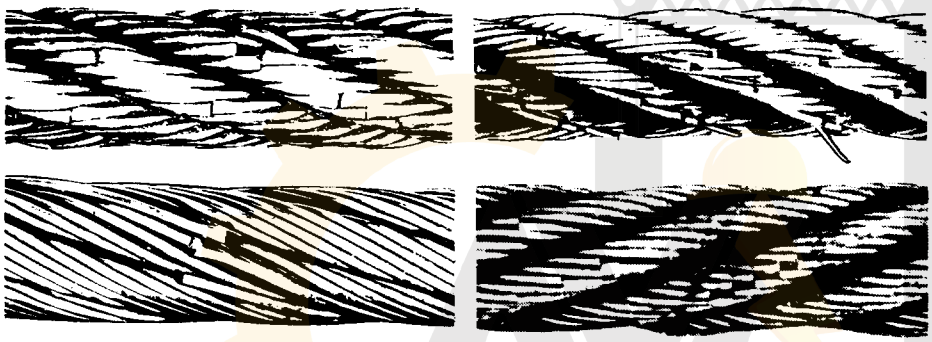
1) Does the rope present any possibility of failure now?
2) Will it be safe until the next inspection?

Proper Way to Remove Broken Wires From Rope



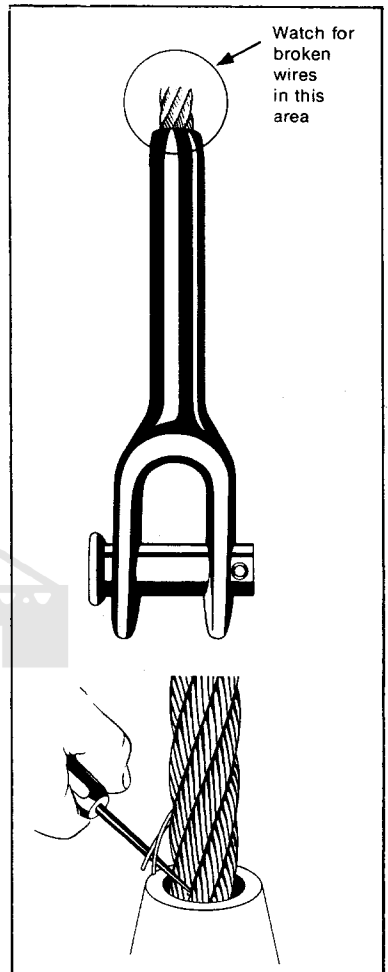
Rope Replacement Criteria Based on the Number of Broken Wires



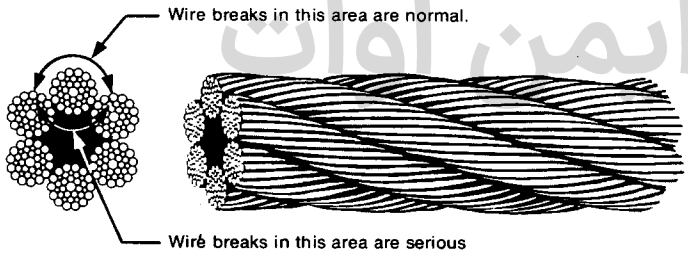


These ropes exhibit wire breaks caused by fatigue after repeated bending over sheaves of the proper size and under moderate loads.

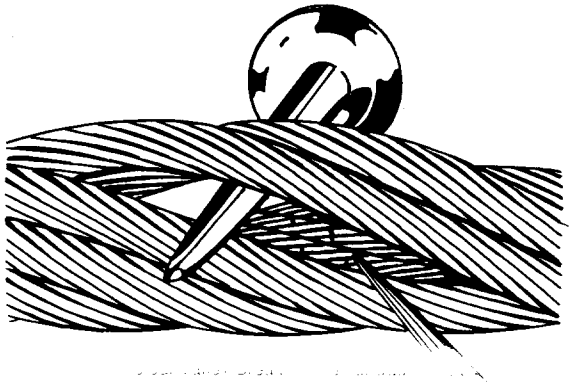
Broken Wires Near Fittings

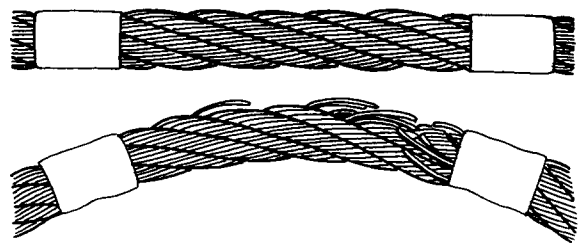


Wire Breaks Inside a Rope



Under ideal and normal conditions, wires should break first on the crowns of strands.



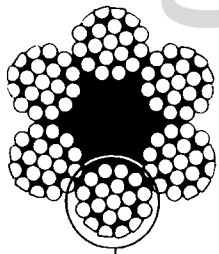


Flexing a rope can often expose broken wires hidden in valleys between strands.

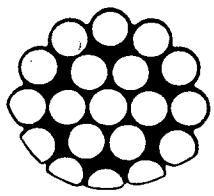
WIRE ROPE

Worn End Abraded Rope

Normal Surface Wear



Section Through Worn Section



Enlarged View of Single Strand

When the surface wires are worn by 1/3 or more of their diameter the rope must be replaced.

Severe wear in Langs Lay, caused by abrasion at cross-over points on multi-layer drum windings.

Severe wear and protrusion of core caused by high bearing pressure on drum and sheaves.

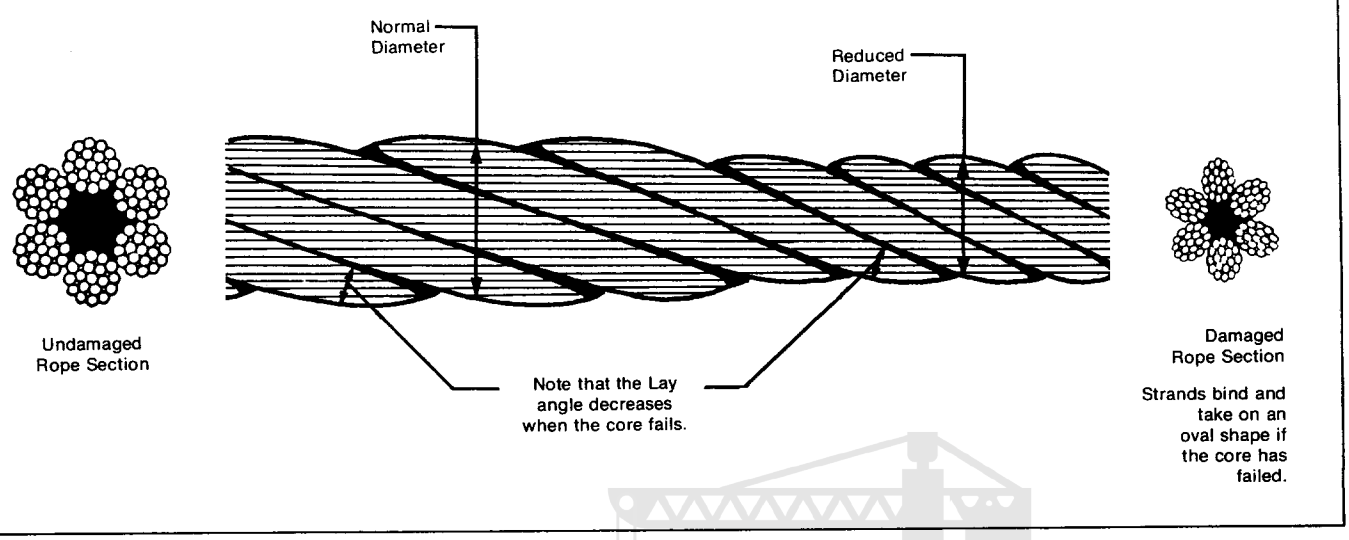
Normal surface wear of 1/3 outer wire dia. on Langs Lay rope.

Normal surface wear of 1/3 outer wire dia. on Regular Lay rope.

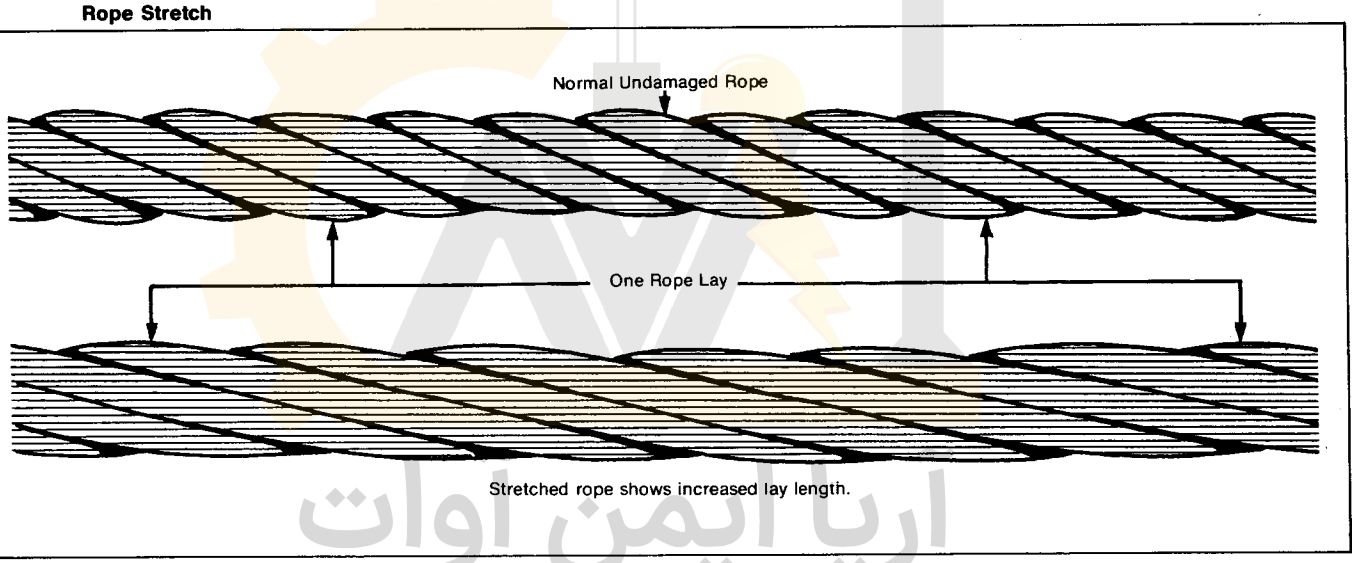
Rope strand indicating the result of severe surface wear and inter-strand nicking, caused by excessive rope loading.

WIRE ROPE

Reduction in Rope Diameter

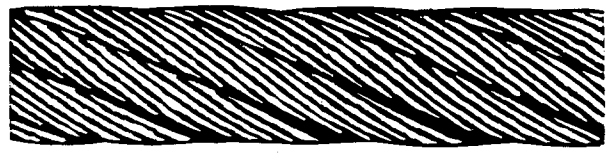


Rope Stretch

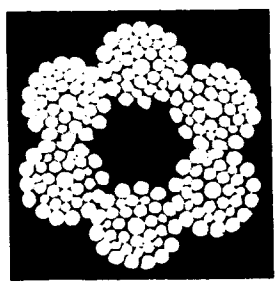


Rope Corrosion

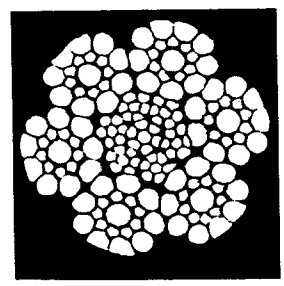
Severe corrosion caused by immersion of rope in chemically treated water.



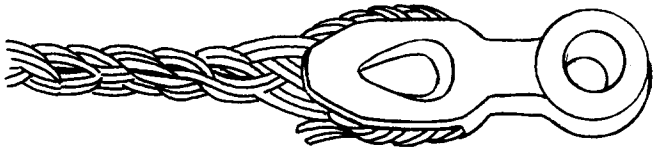
Internal corrosion prominent while external surface shows little evidence of deterioration. Complete lack of strand gap suggests internal degradation.



Substantial wear and severe internal corrosion. High tension, abrasion and corrosive environment are combined in this example.



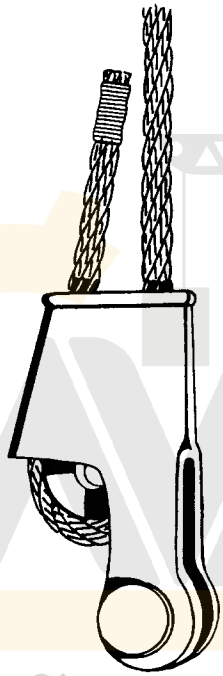
Damaged Splice



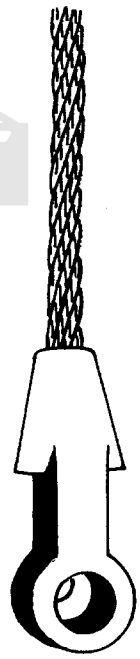
HAND SPLICE
Failure may occur at the first splice tuck.

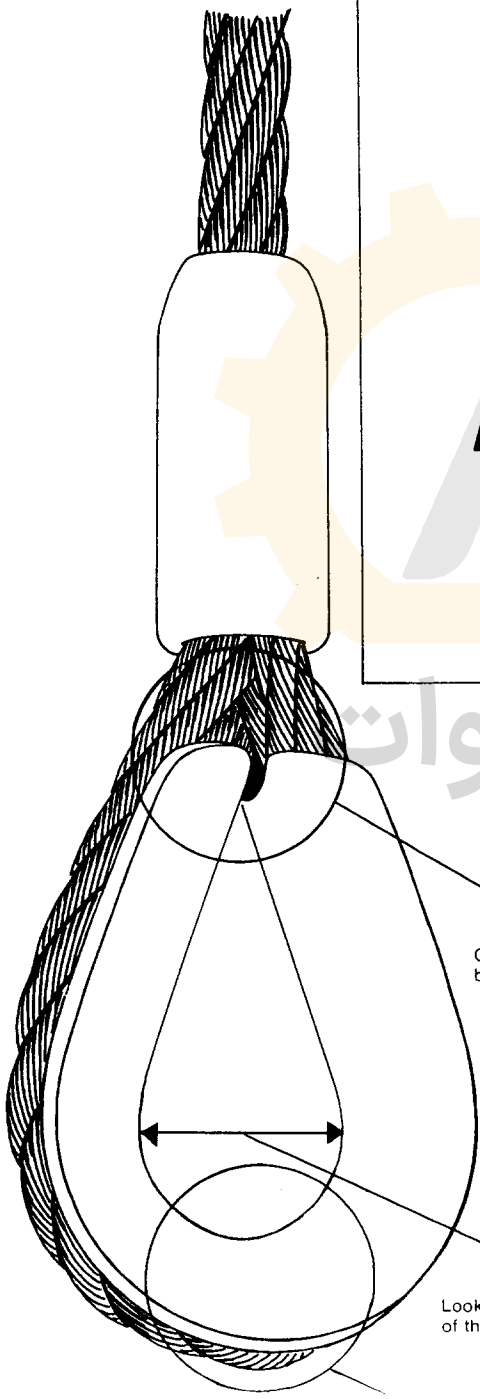
Damaged End Fittings

WEDGE SOCKET
This type of fitting will usually fail at the socket bowl.



POURED ZINC SOCKET
Failure frequently starts at the socket base where the wire enters the fitting.

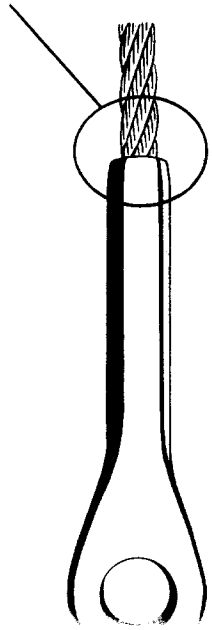




Check that thimble isn't biting into rope.

Look for deterioration or closure of thimble.

SWAGED SOCKETS
Failure may occur at the base of the swaged fitting in this area.



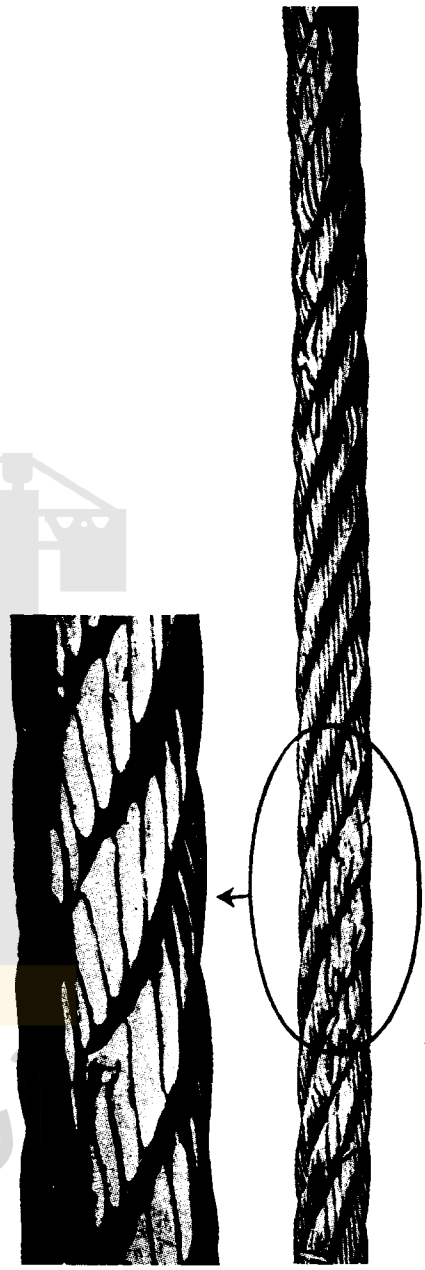
WIRE ROPE

Snagged wires resulting from drum crushing.

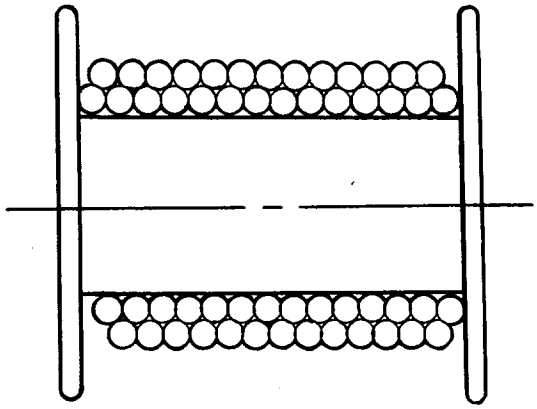
A rope that has been jammed after jumping off a sheave.

Rope subjected to drum crushing. Note the distortion of the individual wires and displacement from their normal position. This is usually caused by the rope scrubbing on itself.

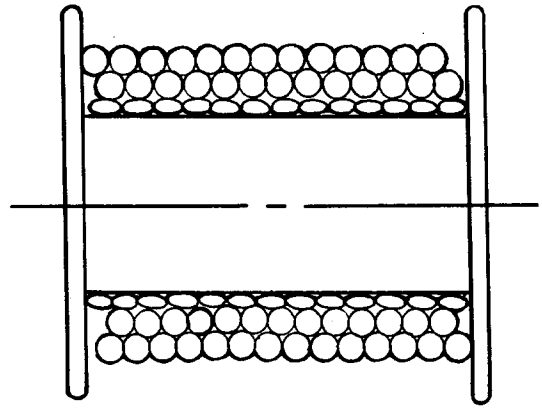
Localized
Crushing of Rope



Drum Crushing

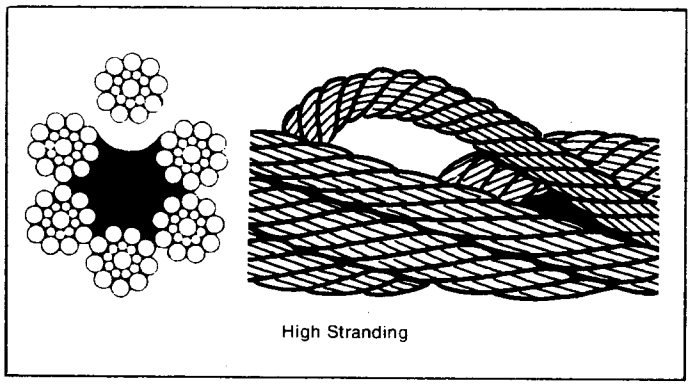


With no more than
2 layers on drum use
any kind of rope



With more than 2 layers on
drum there is danger of crushing —
to avoid use larger wired rope
or IWRC rope.

High Stranding

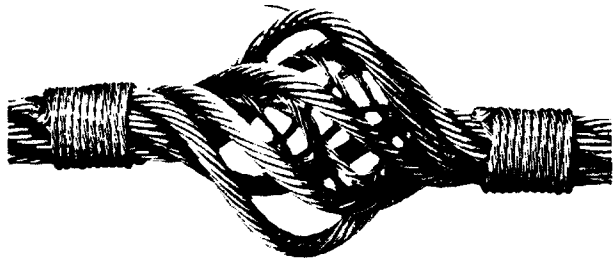


High Stranding

"Bird Cages"

Multi strand rope "bird cages" due to torsional unbalance. Typical of build up seen at anchorage end of multi-fall crane application.

A "bird cage" which has been forced through a tight sheave.

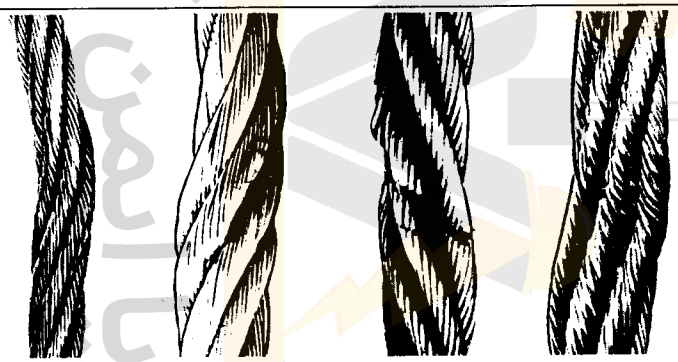


A "bird cage" caused by sudden release of tension and resultant rebound of rope from overloaded

WIRE ROPE

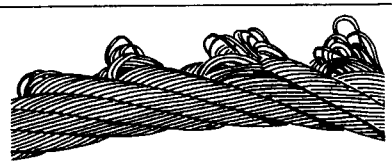
Rope Kinks

An open kink such as this is often caused by improper handling and uncoiling as shown.



These ropes show the severe damage that results when kinked ropes are used. Local wear, distortion, misplaced wires and early failure are inevitable.

Core Protrusion



Core protrusion as a result of torsional unbalance created by shock loading.

Protrusion of IWRC resulting from shock loading.

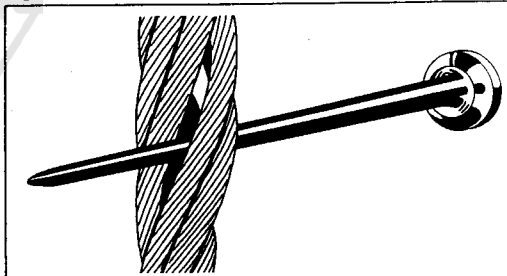
Unbalanced Severely Worn Areas

Fatigued wires in one section of the rope only. Remainder shows relatively good condition.

Localized wear over an equalizing sheave. The danger of this type wear is that it is not visible during operation of the rope. This emphasizes the need of regular inspection of this portion of an operating rope.

Localized wear due to abrasion on supporting structure. Vibration of rope between drum and jib head sheave.

Proper Method of Opening up a Rope



To open a rope, insert marlin spike beneath two strands and rotate to lift strands and provide view of interior.

Typical Rope Damage

Narrow path of wear resulting in fatigue fractures, caused by working in a grossly oversize groove, or over small support rollers.

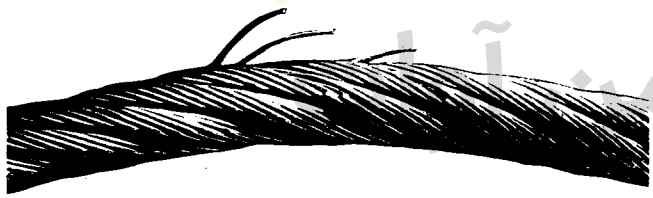
Break up of IWRC resulting from high stress application. Note nicking of wires in outer strands.

Two parallel paths of broken wires indicative of bending through an undersize groove in the sheave.

Wire fractures at the strand, or core interface, as distinct from crown fractures, caused by failure of core support.

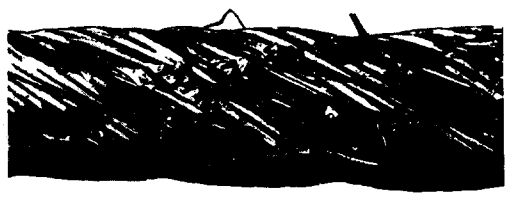
An example of fatigue failure of a wire rope which has been subjected to heavy loads over small sheaves. The usual crown breaks are accompanied by breaks in the valleys of the strands, these breaks being caused by strand nicking resulting from the heavy loads.

Wire rope that shows severe wear & fatigue from operating over small sheaves with heavy load and severe abrasion

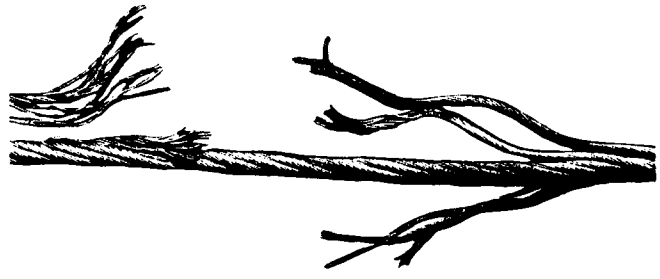


A rope failing from fatigue after bending over small sheaves.

A wire rope which has jumped a sheave. The rope itself is deformed into a "curl" as if bent around a round shaft. Close examination of the wires show two types of breaks — normal tensile "cup and cone" breaks and shear breaks which give the appearance of having been cut on an angle with a cold chisel.



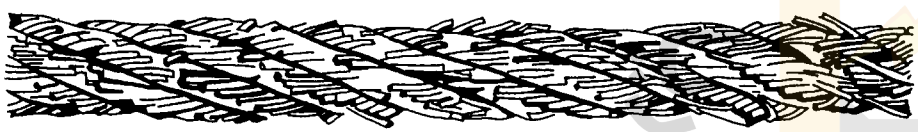
Mechanical damage due to rope movement over sharp edge projection while under load.



Rope break due to excessive strain.

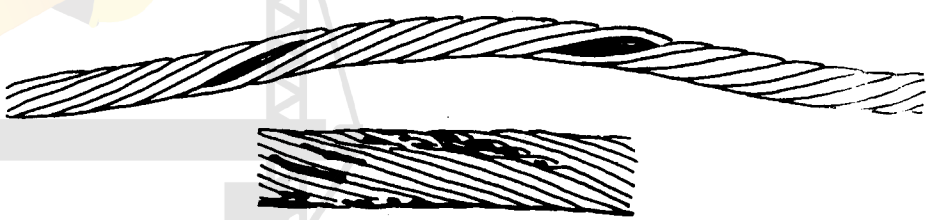
WIRE ROPE

(Continued) Typical Rope Damage



Rapid appearance of many broken wires.

Wear and damage on one side of rope.

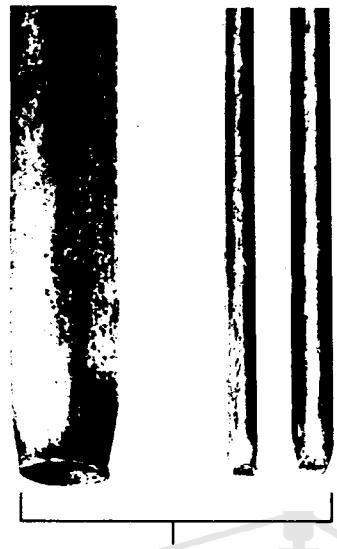


A single strand removed from a wire rope subjected to "strand nicking". This condition is the result of adjacent strands rubbing against one another and is usually caused by core failure due to continued operation of a rope under high tensile load. The ultimate result will be individual wire breaks in the valleys of the strands.

Typical Wire Failures

Abrasive Wear

Sharp Bend & Heavy Load



Tensile Failure Due to Overload

Severe Corrosion & Moderate Load

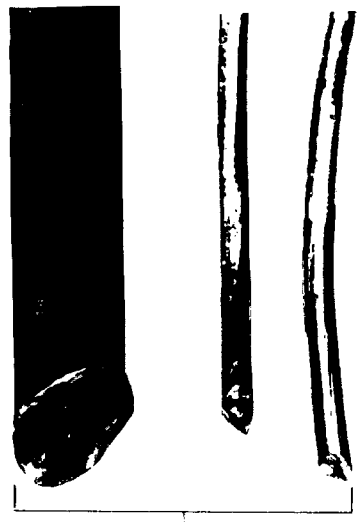
Bending Fatigue

Hammering (Vibration) Fatigue

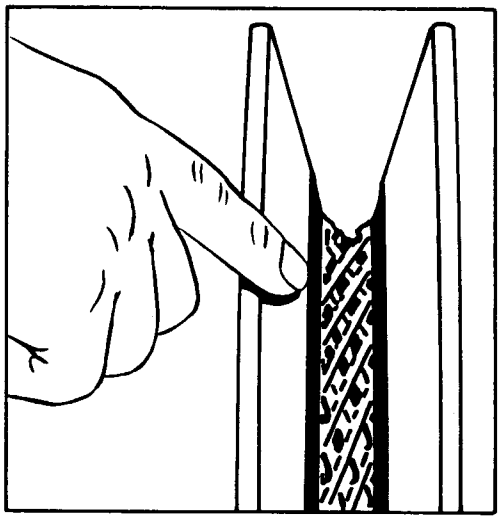
Corrosion Fatigue

Plastic Wear (Jammed Wire)

Torsion Break



Sheared & Cut

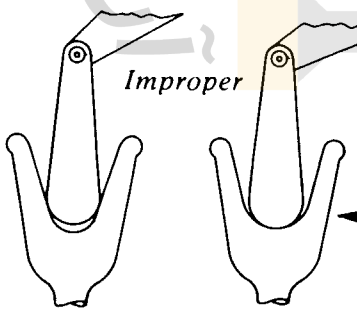


A sheave badly corrugated by the rope's "print", a condition which could seriously damage the wire rope.

Check flanges for wear, chips and cracks.

Check sheave grooves for wear.

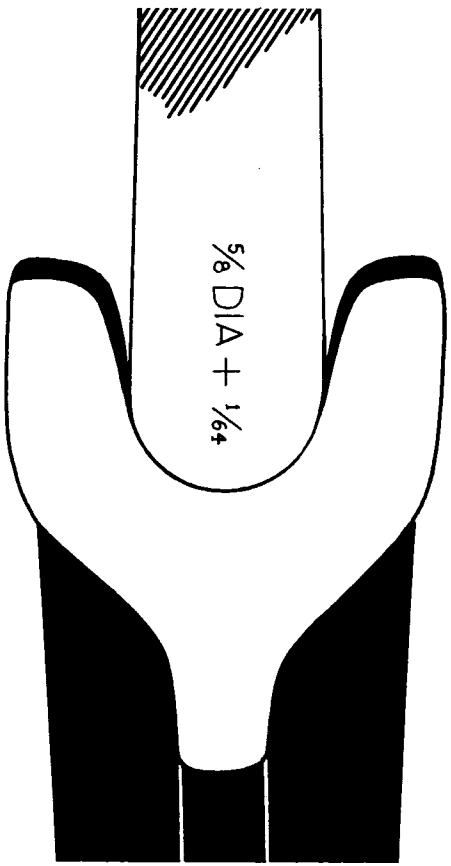
Check bearings for wobble, lubrication & ease of rotation.



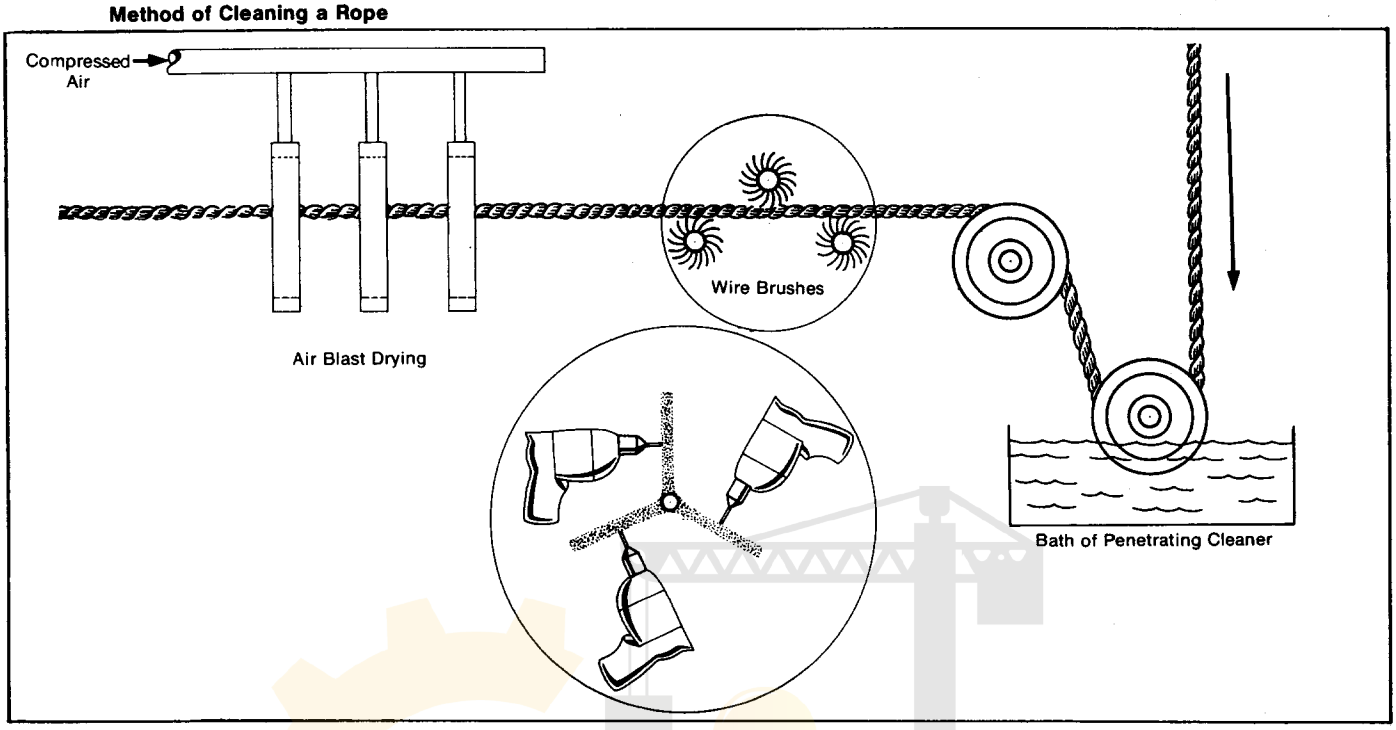
Observe the groove so that it may be clearly seen whether the contour of the gauge matches the contour of the bottom of the groove.

Check grooves for proper size

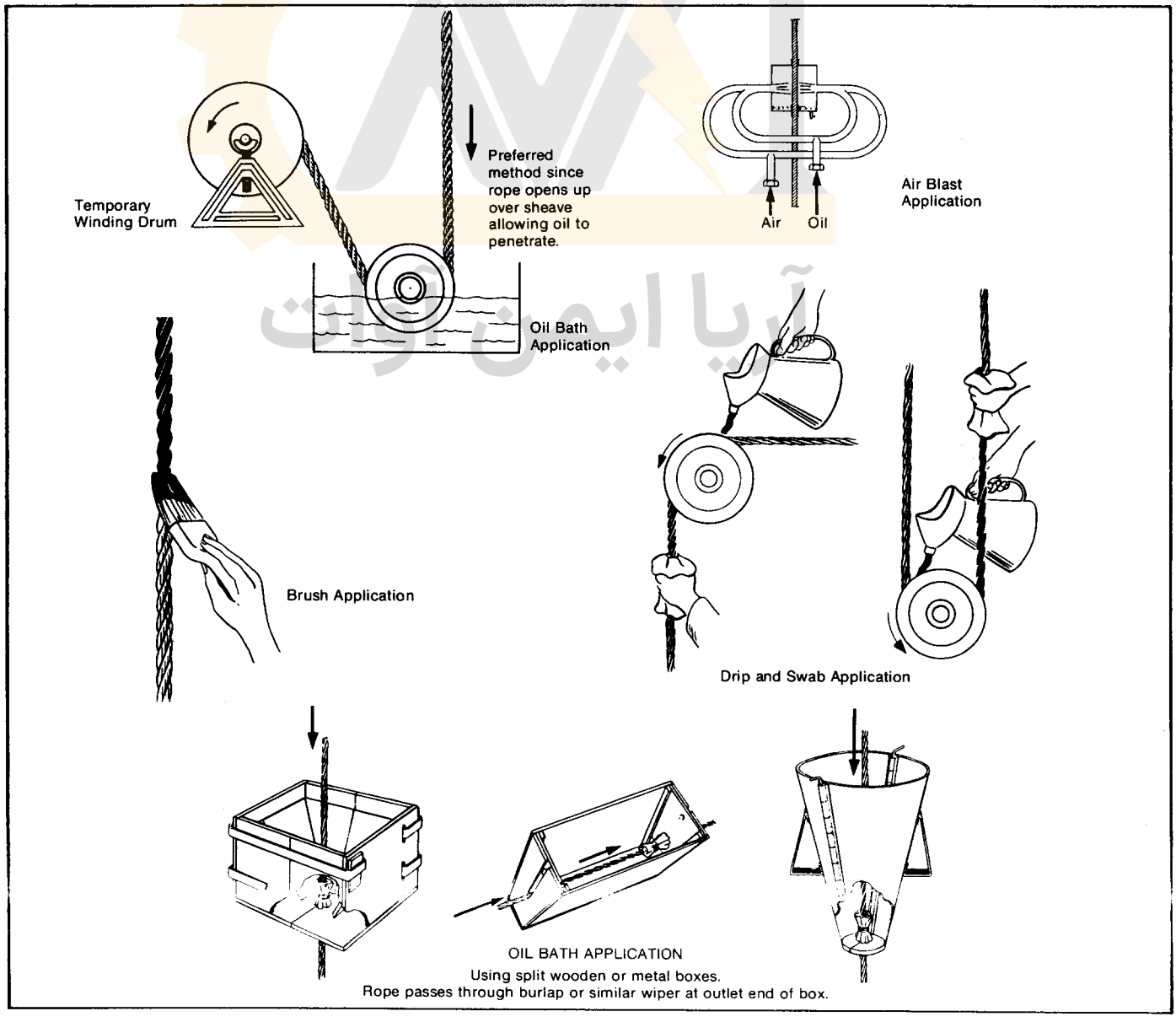
A proper fitting sheave groove should support the rope over 135-150 degrees of rope circumference.



Method of Cleaning a Rope

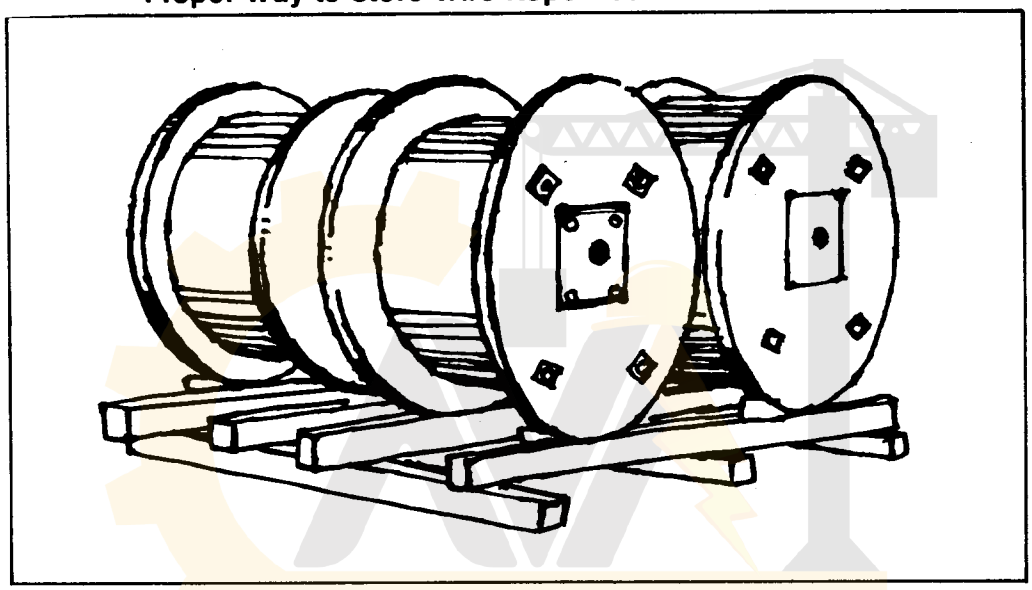


Methods of Lubricating Rope

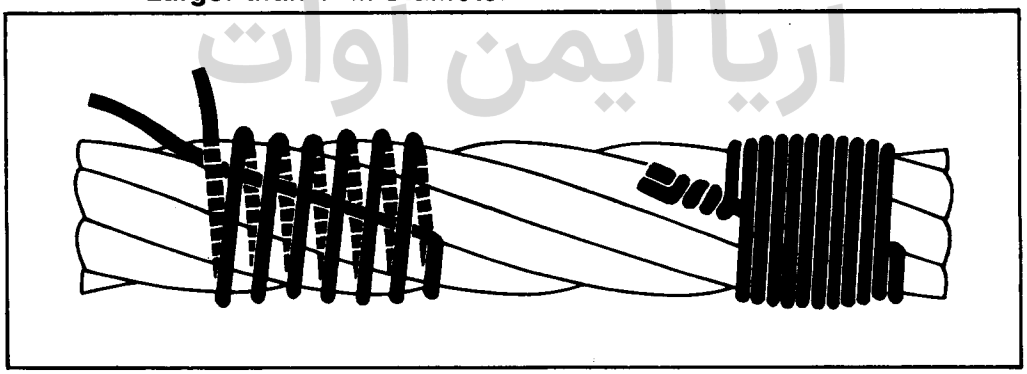


WIRE ROPE

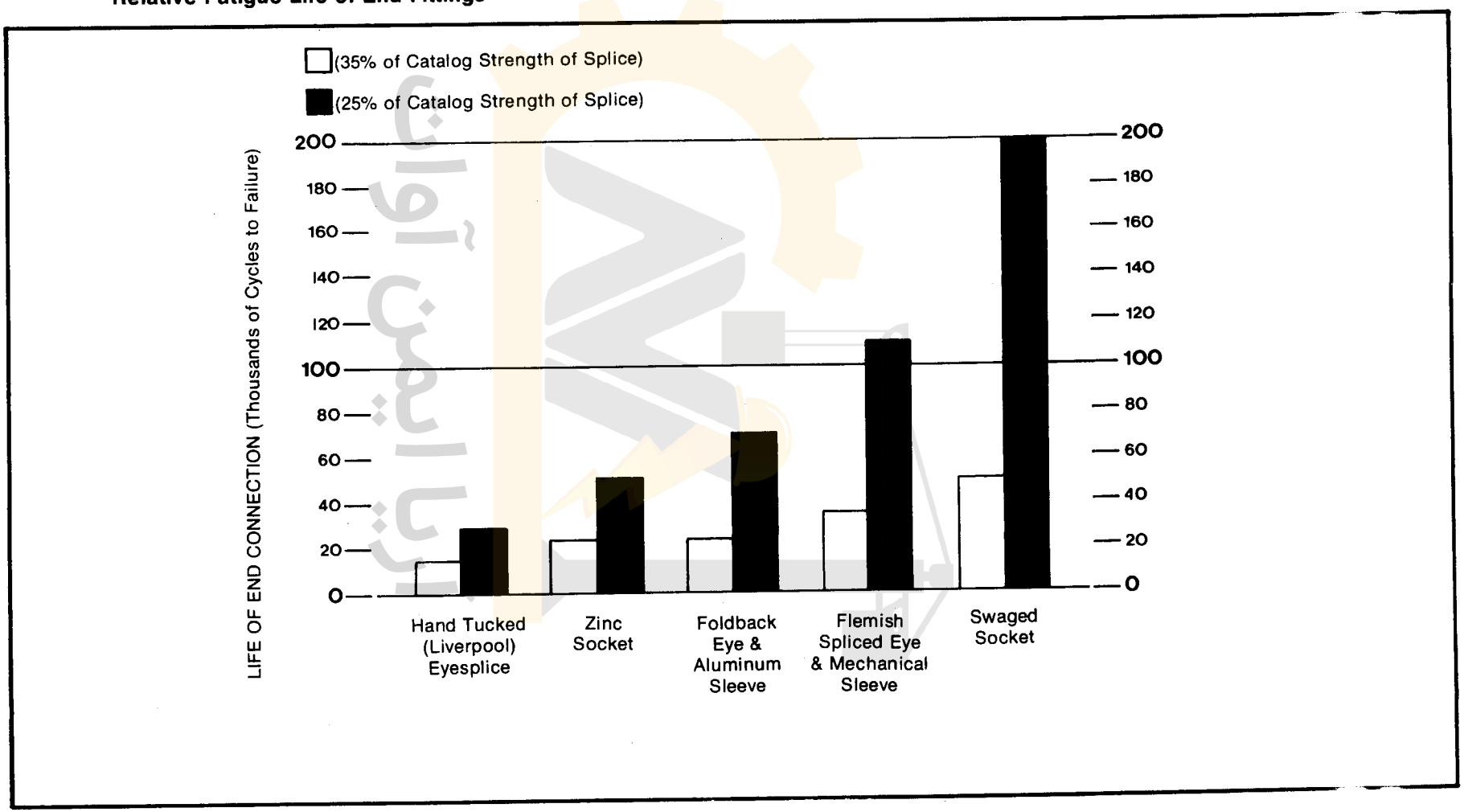
Proper Way to Store Wire Rope Reels



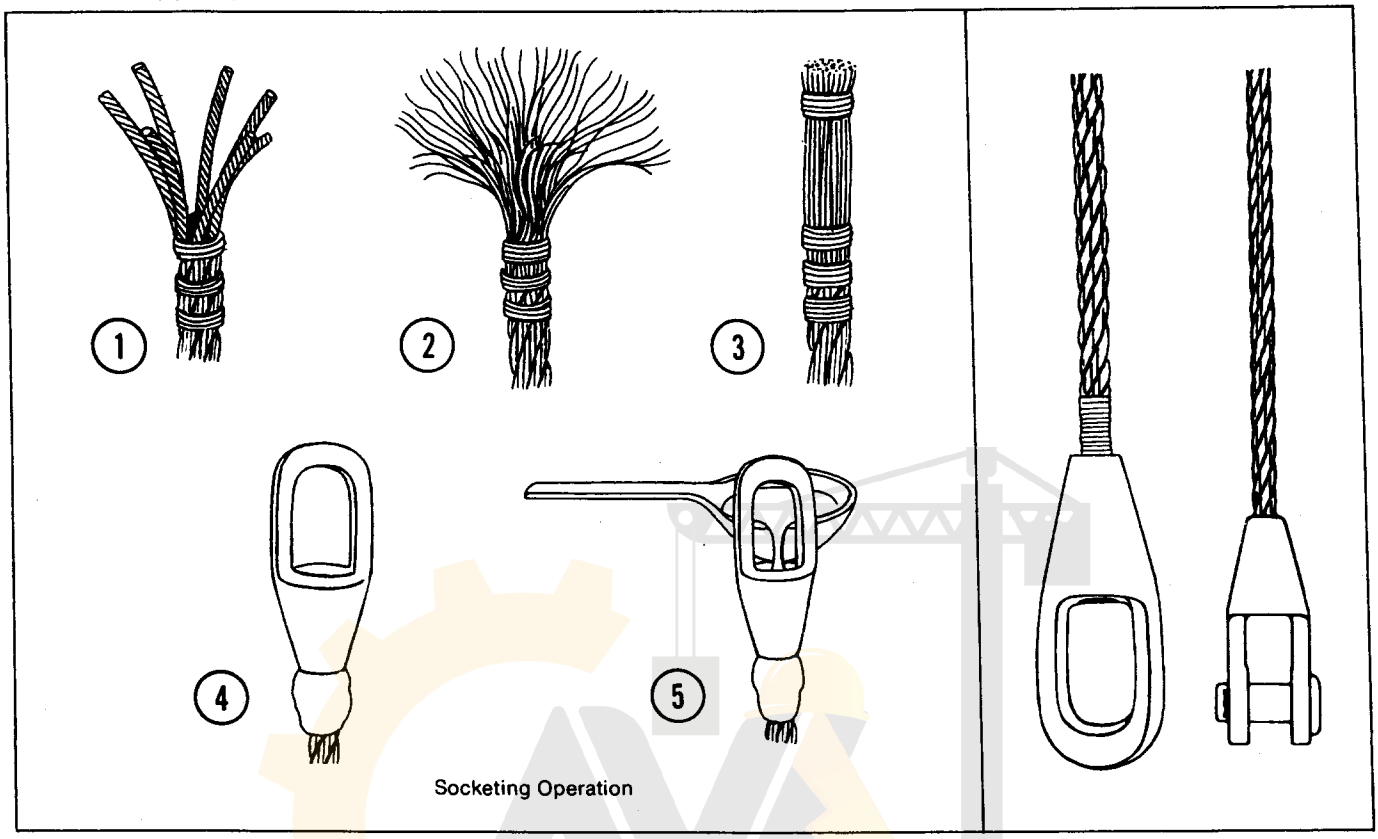
Proper Method of Seizing a Rope Larger than 1″ in Diameter



Relative Fatigue Life of End Fittings

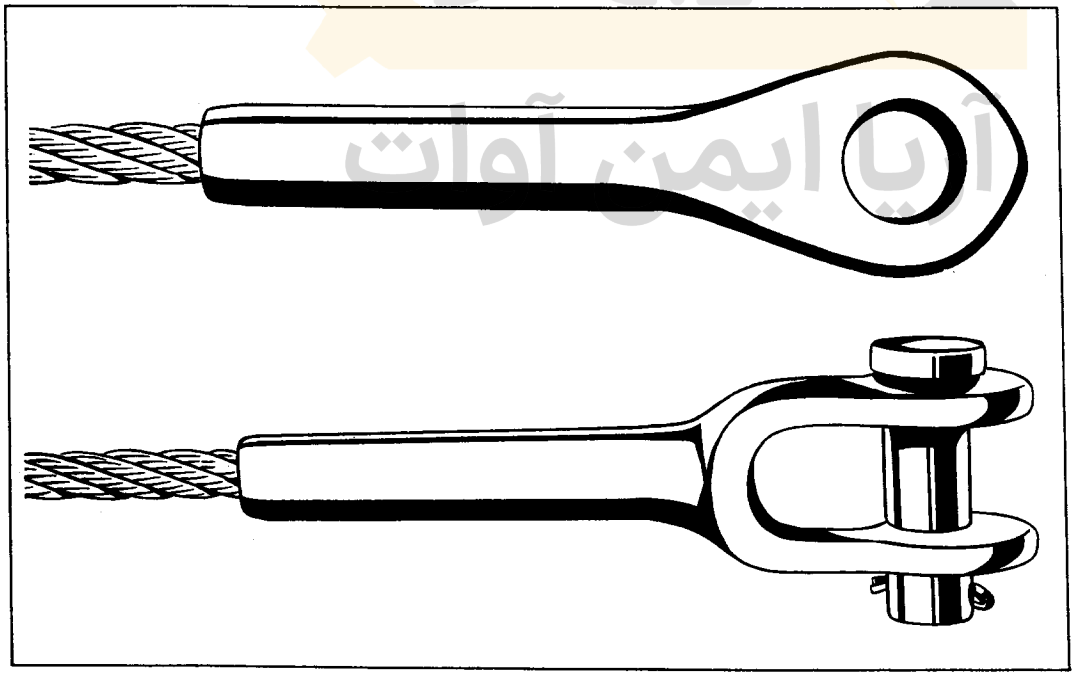


Zinc (Spelter) Sockets

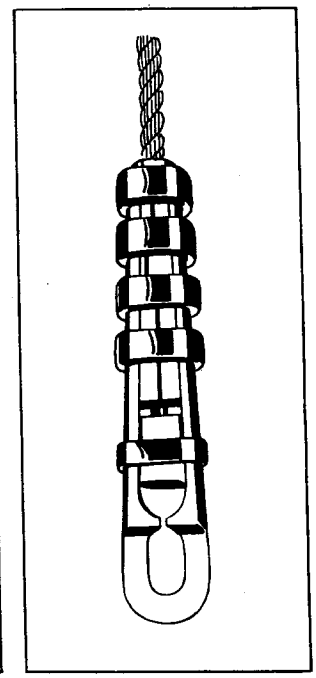


Socketing Operation

Swaged Sockets

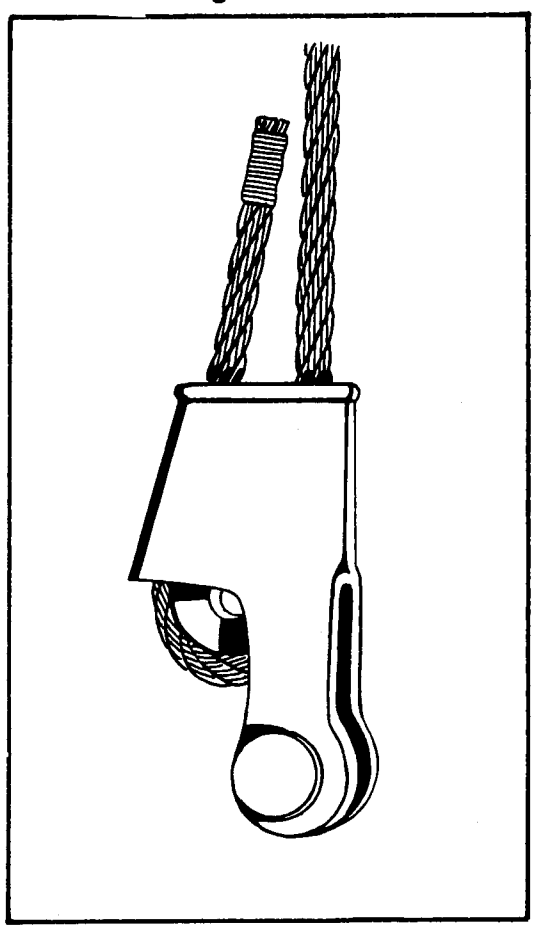


Cappel Socket

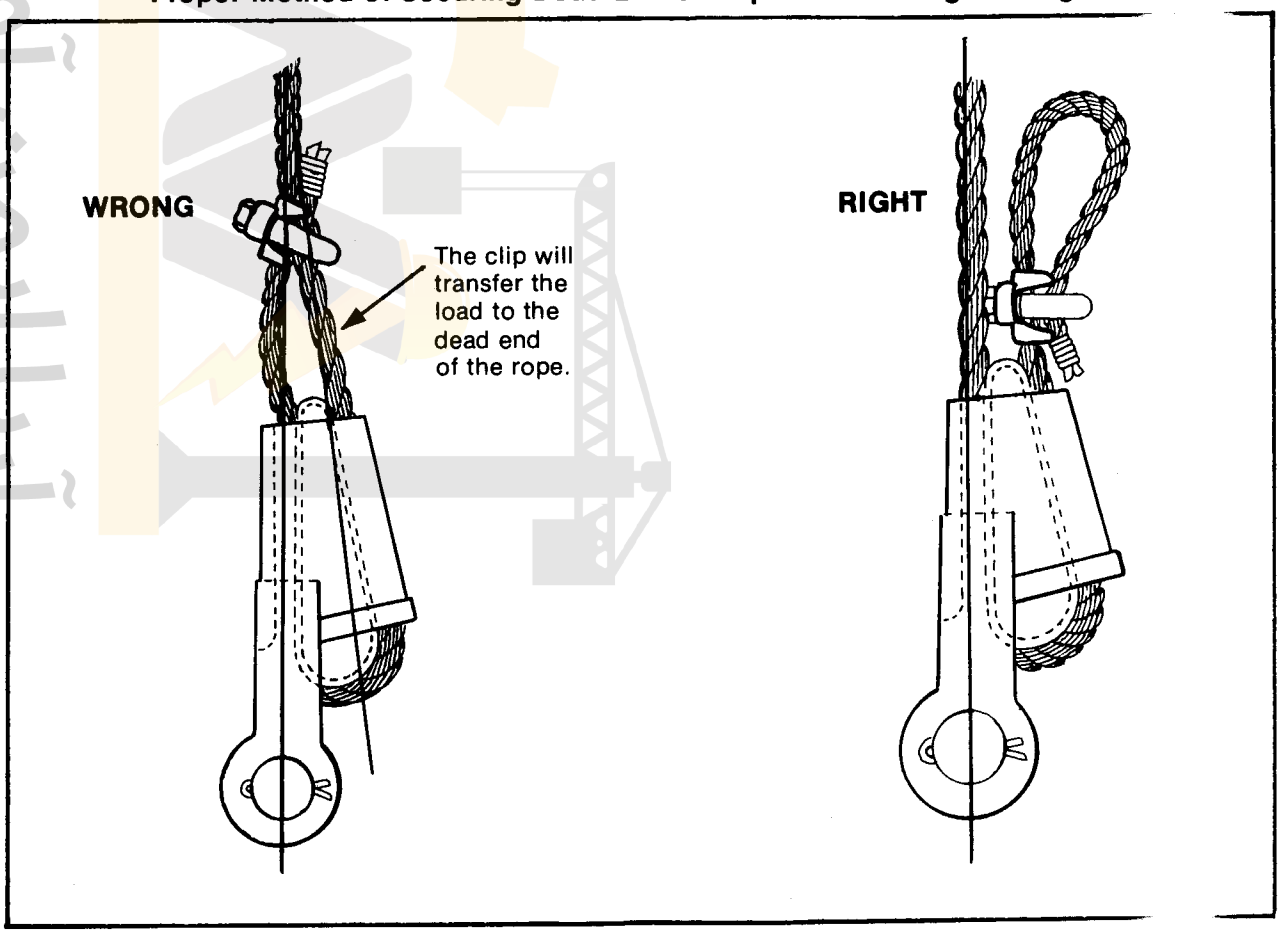


WIRE ROPE

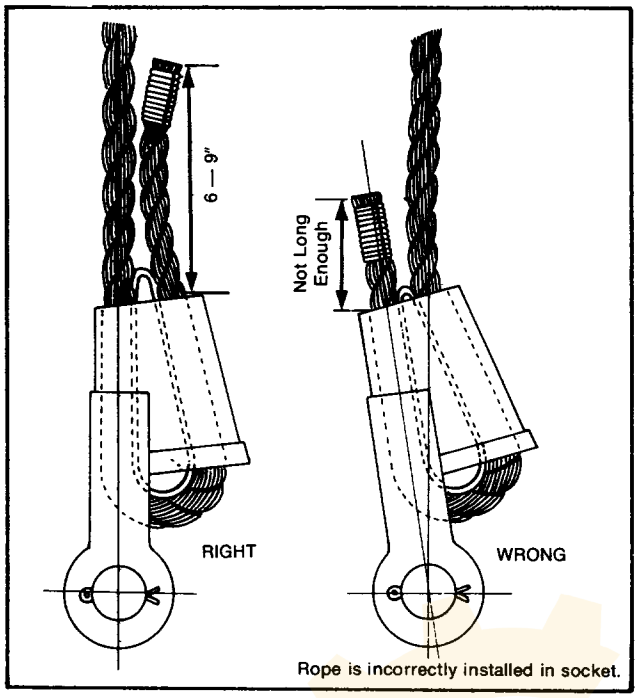
Wedge Socket



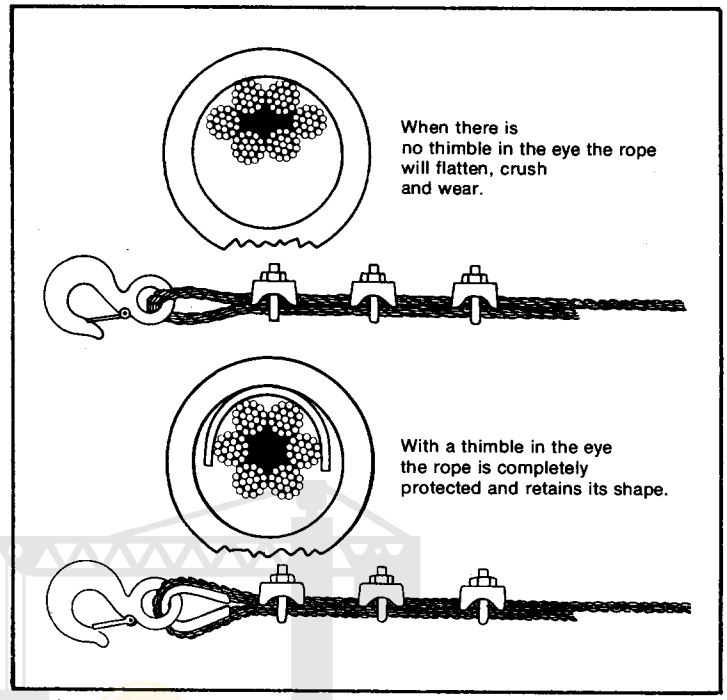
Proper Method of Securing Dead End of Rope When Using a Wedge Socket



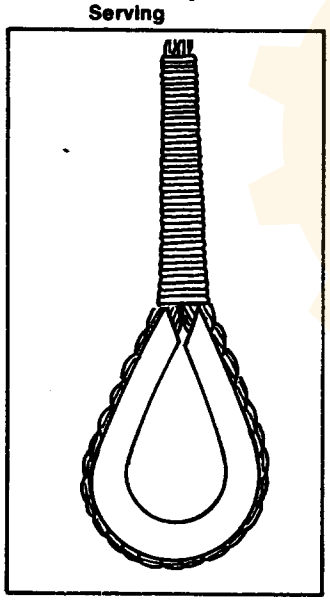
Installing a Wedge Socket on a Rope



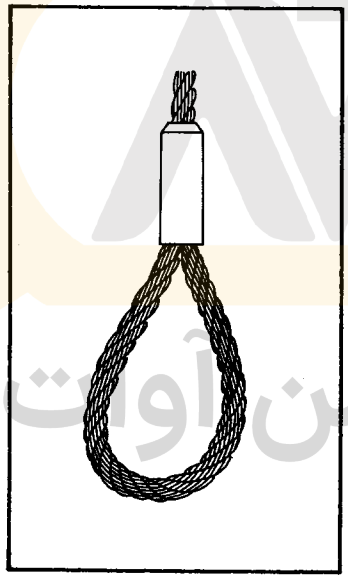
Reason Why a Thimble Should Be Used in All Eyes



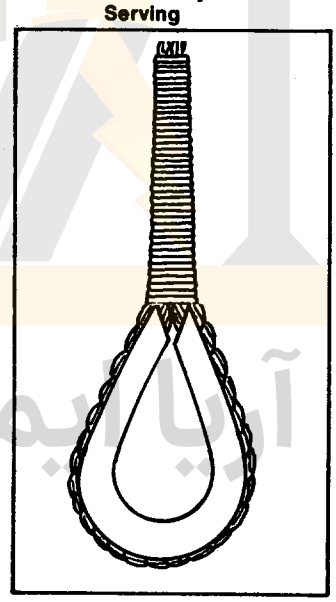
Flemish Eye and Serving



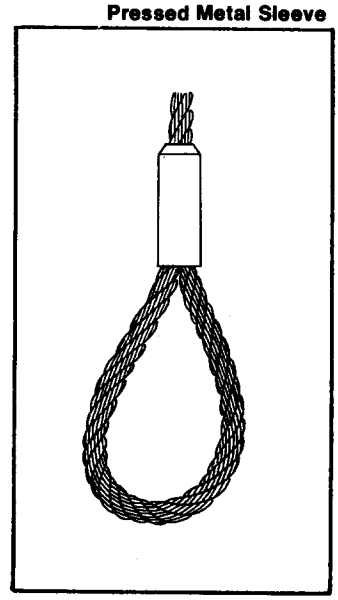
Flemish Eye and Pressed Metal Sleeve



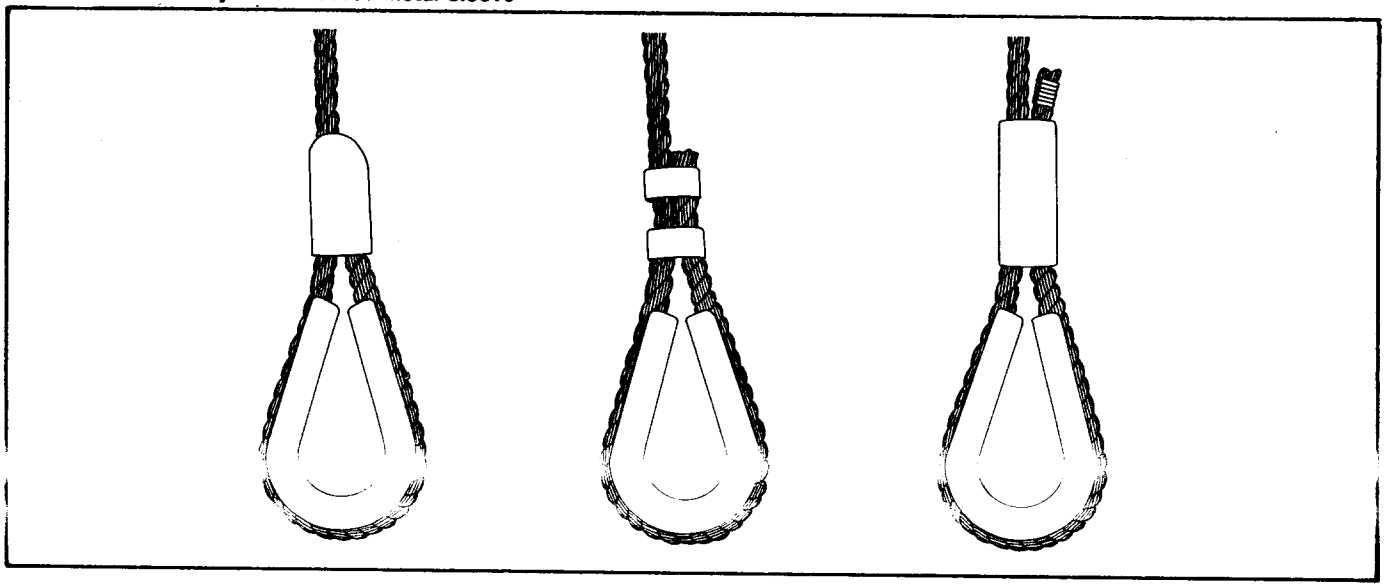
Tucked Eye and Serving



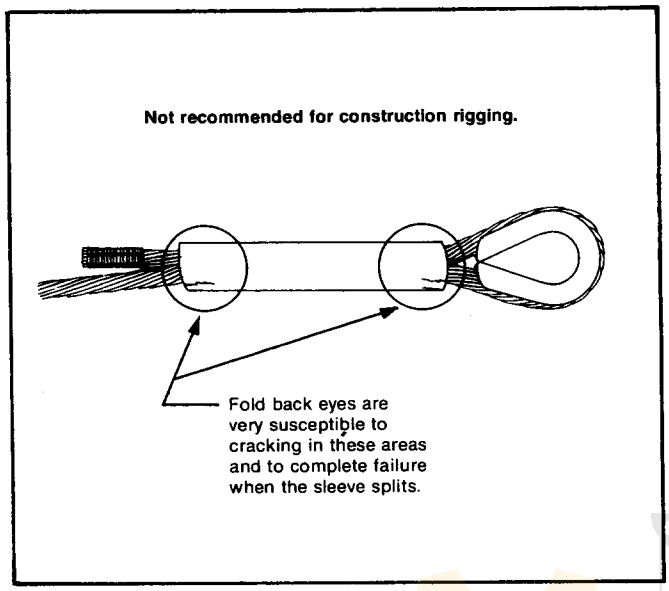
Tucked Eye and Pressed Metal Sleeve



Fold Back Eye and Pressed Metal Sleeve



Failure of Fold Back Eye Splice



Clamp and Thimble Connection

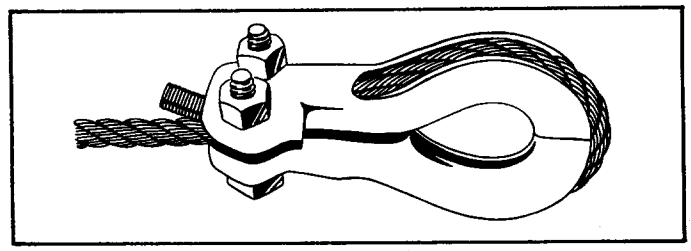
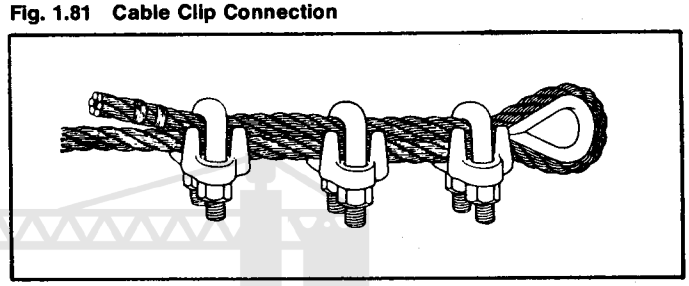
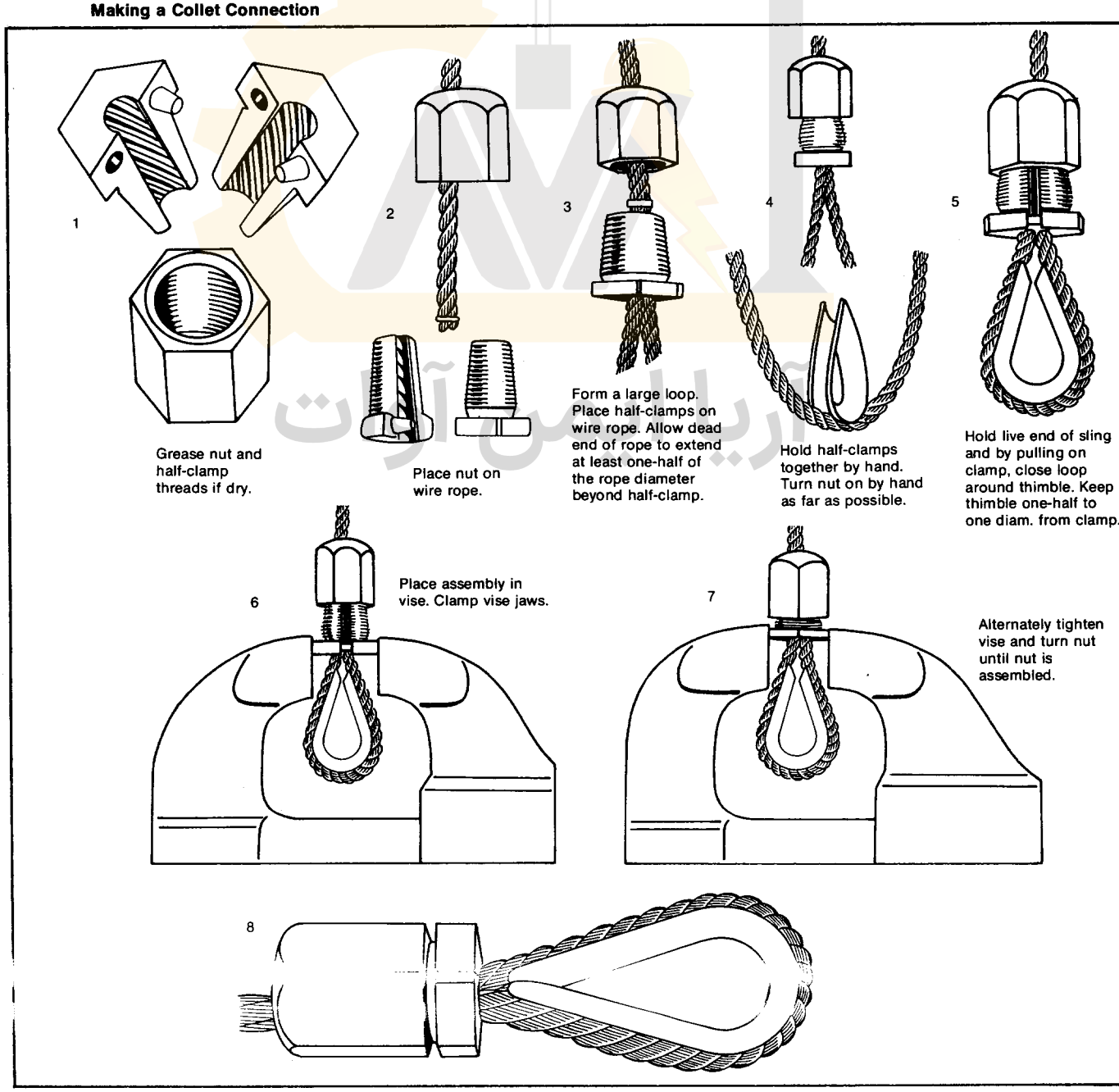


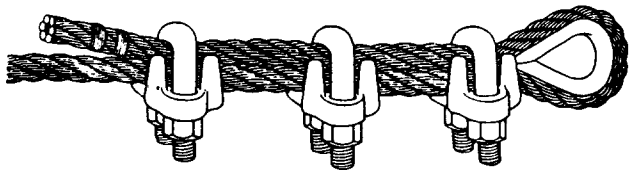
Fig. 1.81 Cable Clip Connection



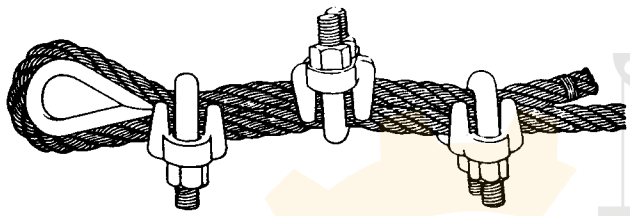
Making a Collet Connection



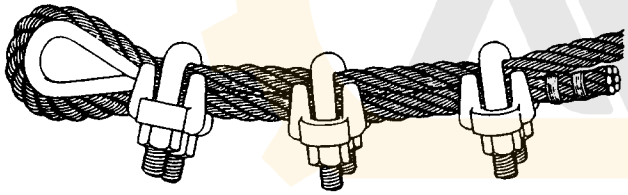
Right and Wrong Ways of Using Cable Clips



Correct
U-Bolt of all clips on dead end of rope

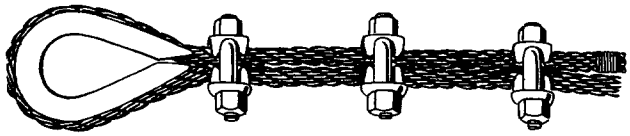


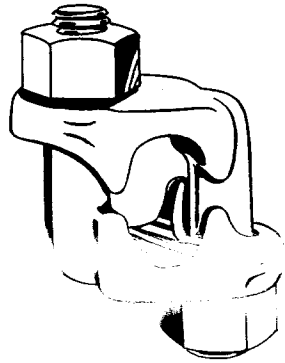
Incorrect
Do not stagger clips



Incorrect
U-Bolt of all clips on live end of rope

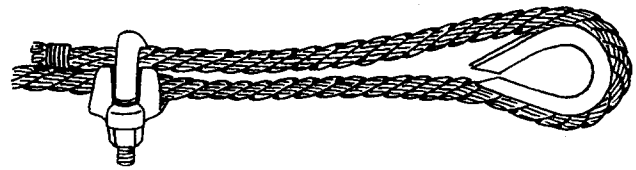
Double Saddle Clips (Fist Grip Clips)





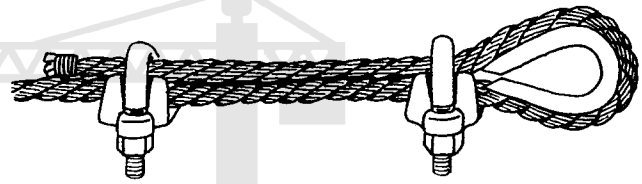
Proper Method of Installing Cable Clips

STEP 1



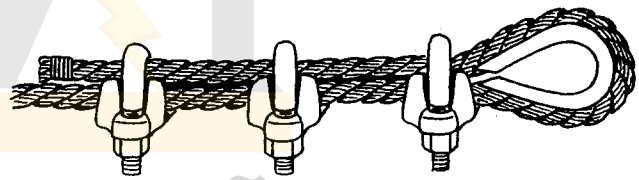
APPLY FIRST CLIP — one base width from dead end of wire rope — U-Bolt over dead end — live end rests in clip saddle. Tighten nuts evenly to recommended torque.

STEP 2



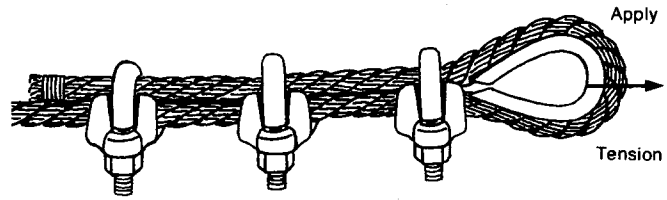
APPLY SECOND CLIP — nearest loop as possible — U-Bolt over dead end — turn on nuts firm but DO NOT TIGHTEN.

STEP 3



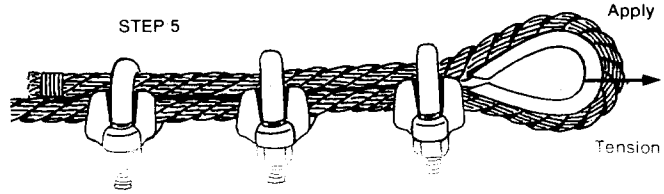
ALL OTHER CLIPS — Space equally between first two.

STEP 4



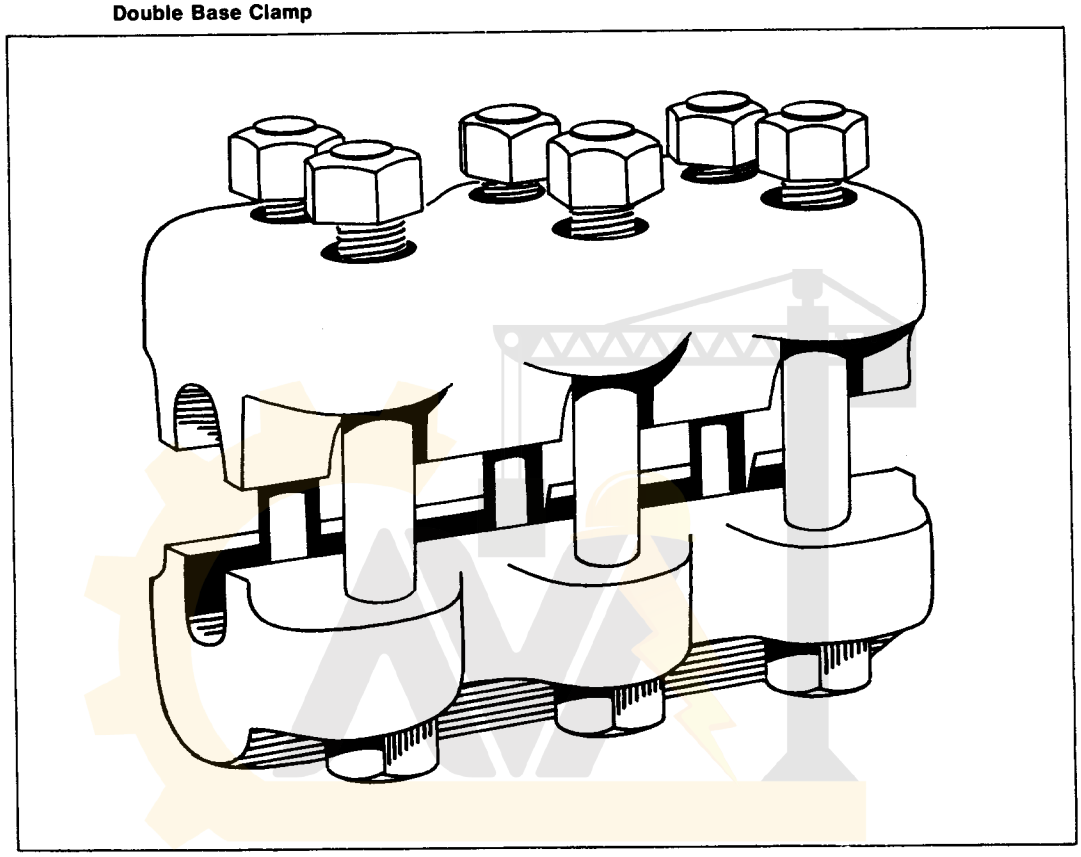
Apply tension and tighten all nuts to recommended torque.

STEP 5

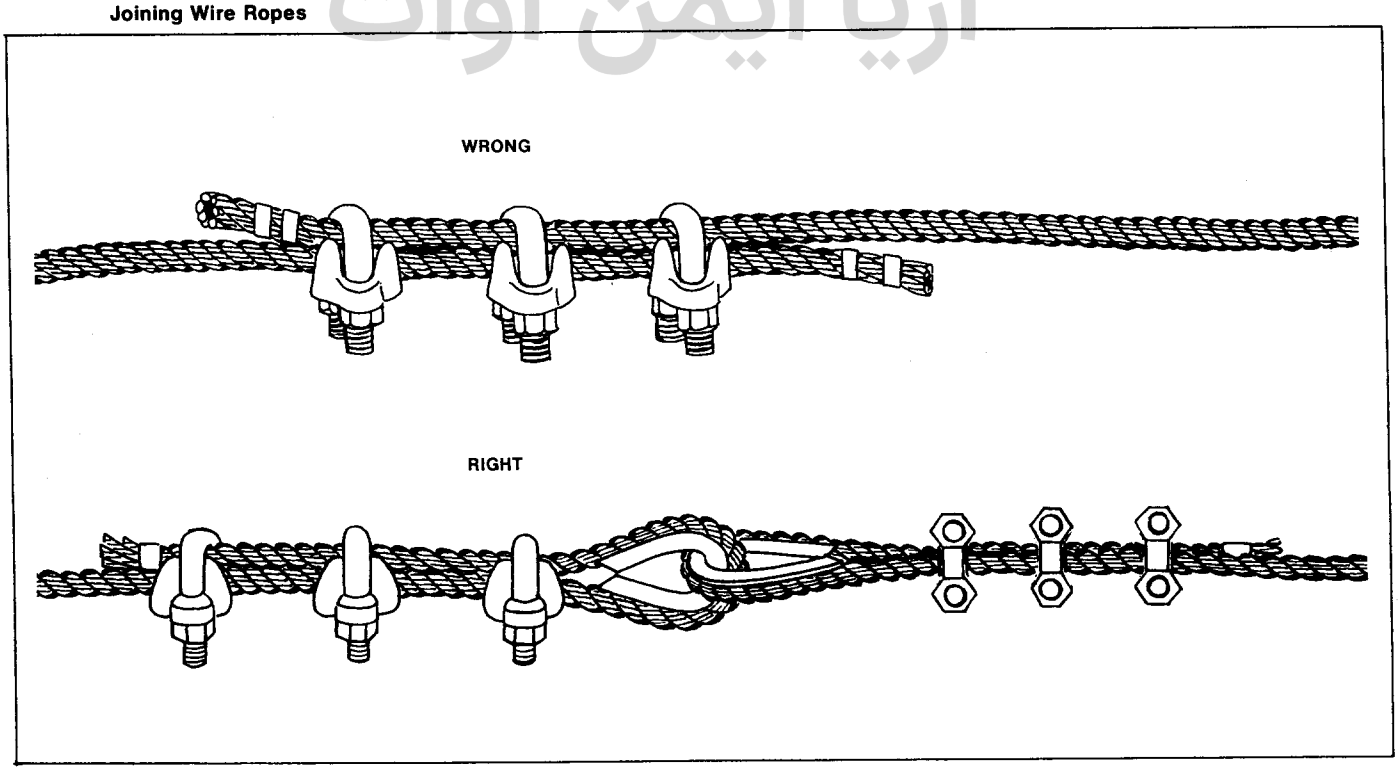


Recheck nut torque after rope has been in operation.

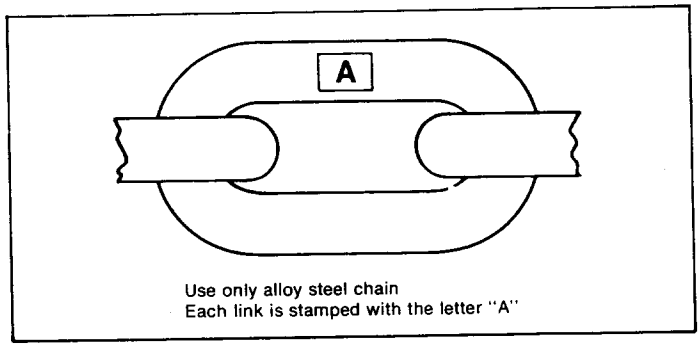
Double Base Clamp



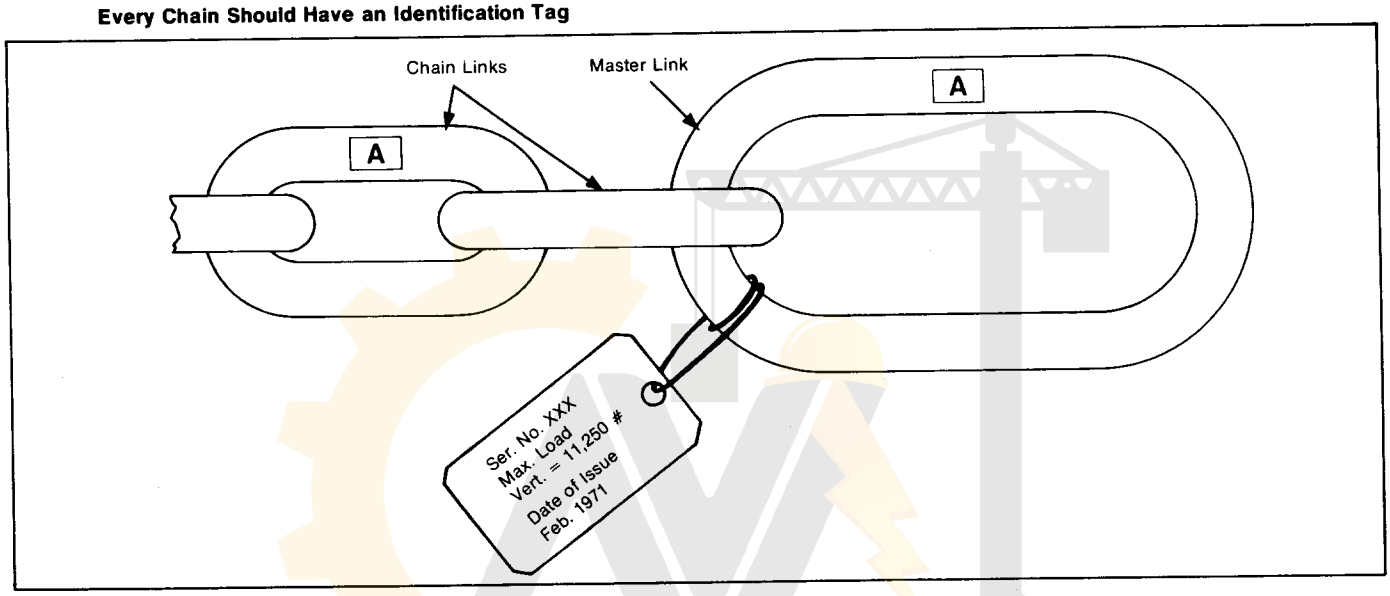
Joining Wire Ropes



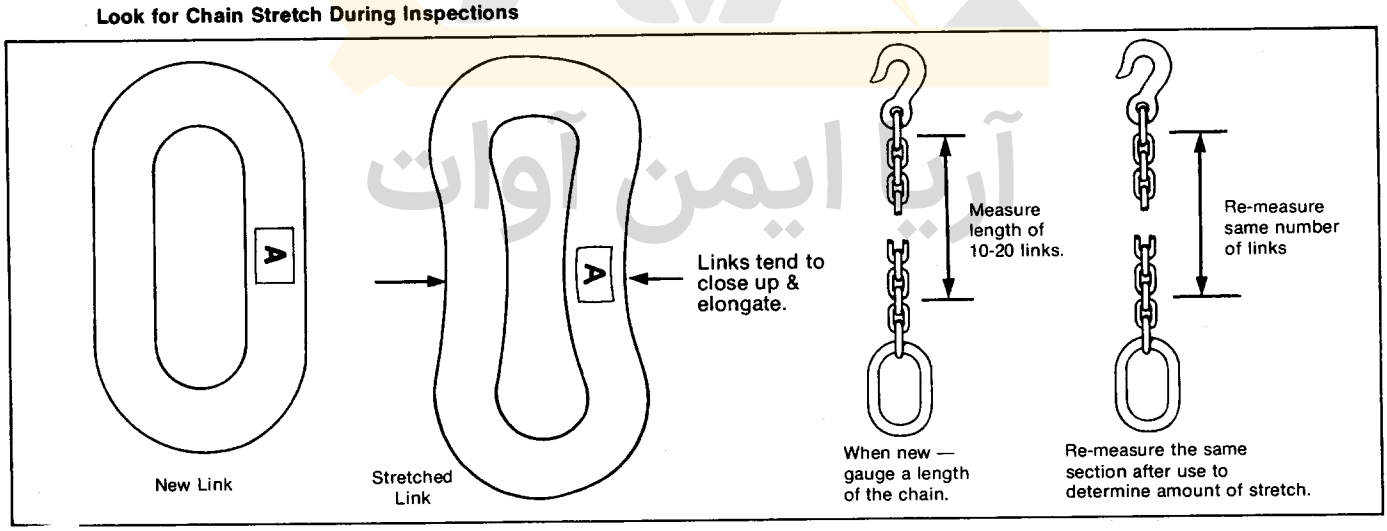
dentification of Alloy Steel Chain



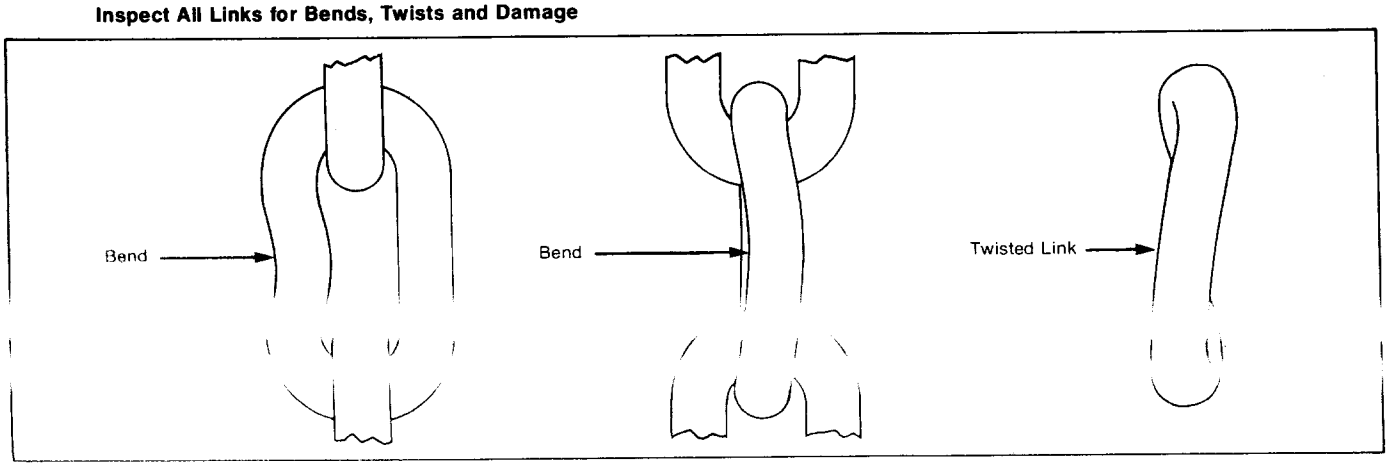
Every Chain Should Have an Identification Tag



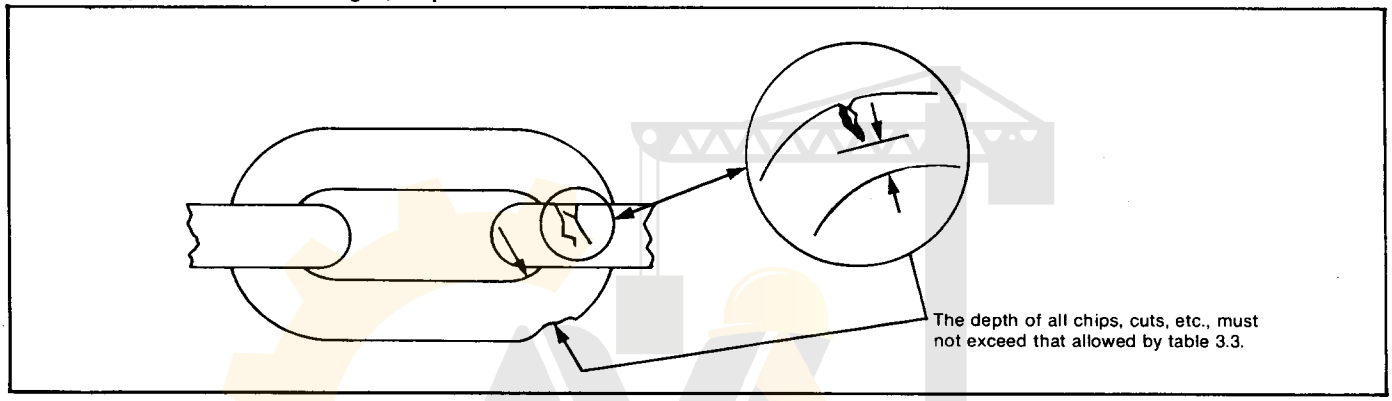
Look for Chain Stretch During Inspections



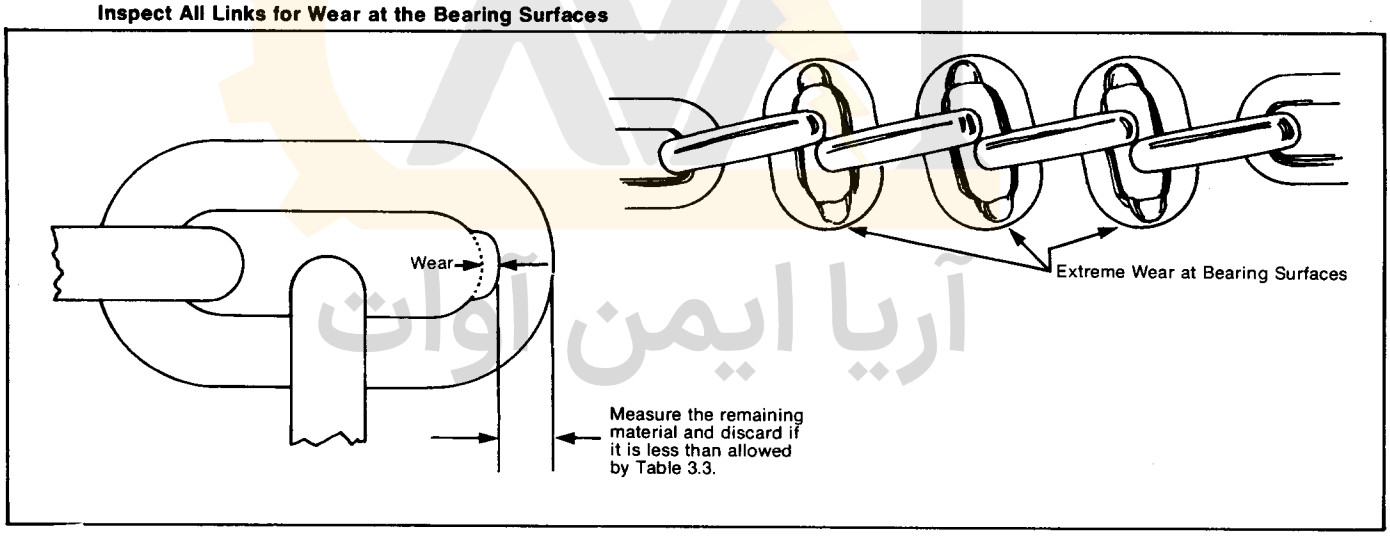
Inspect All Links for Bends, Twists and Damage



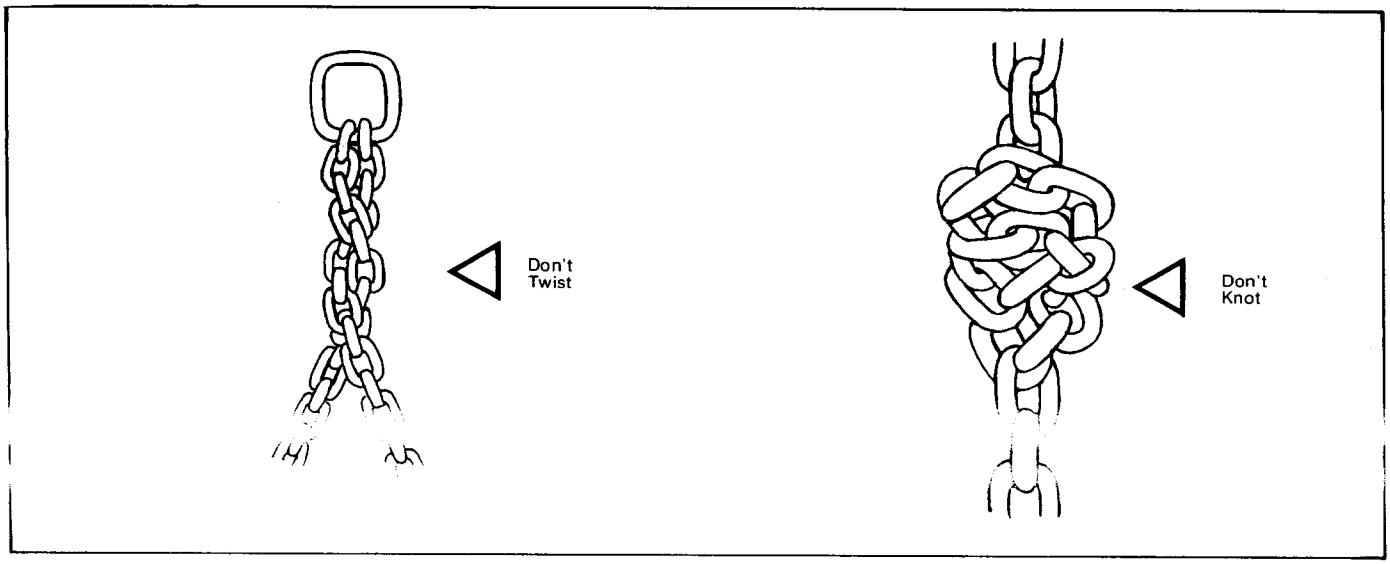
Inspect All Links for Gouges, Chips and Cuts



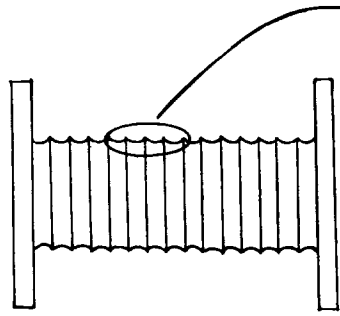
Inspect All Links for Wear at the Bearing Surfaces



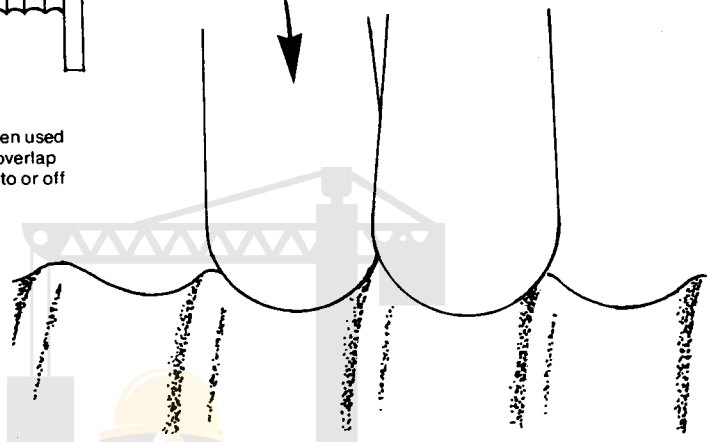
Never Twist or Knot a Chain



Check Drum Grooves During Inspections

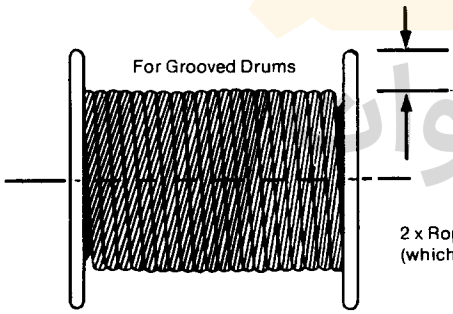


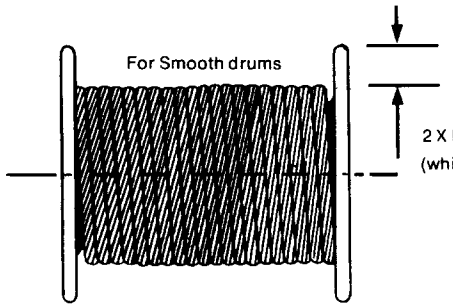
Even though both these gauges properly follow groove contours, when used side-by-side they indicate grooves are too close. Two gauges which overlap in this manner reveal that wraps of rope will scrub when spooling on to or off the drum.



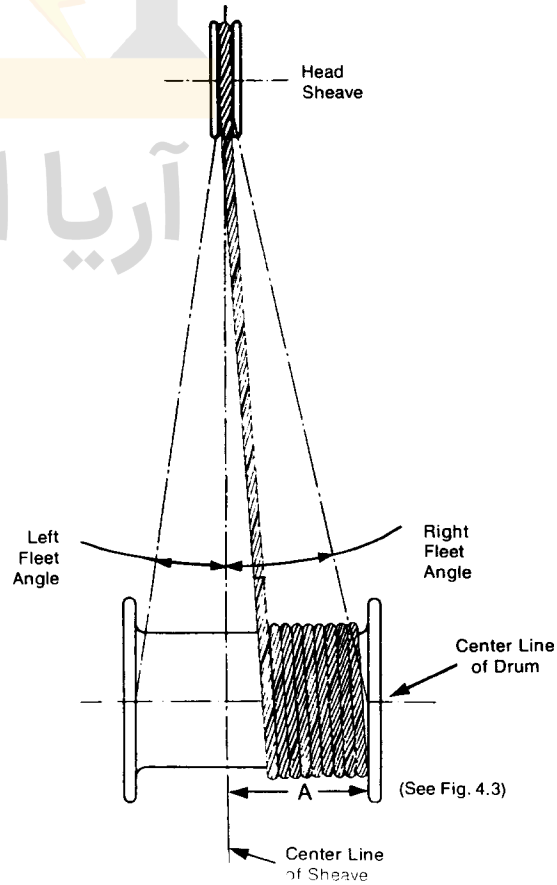
Maximum Drum Capacity

The top layer of rope must not be closer to the flange tips than shown.

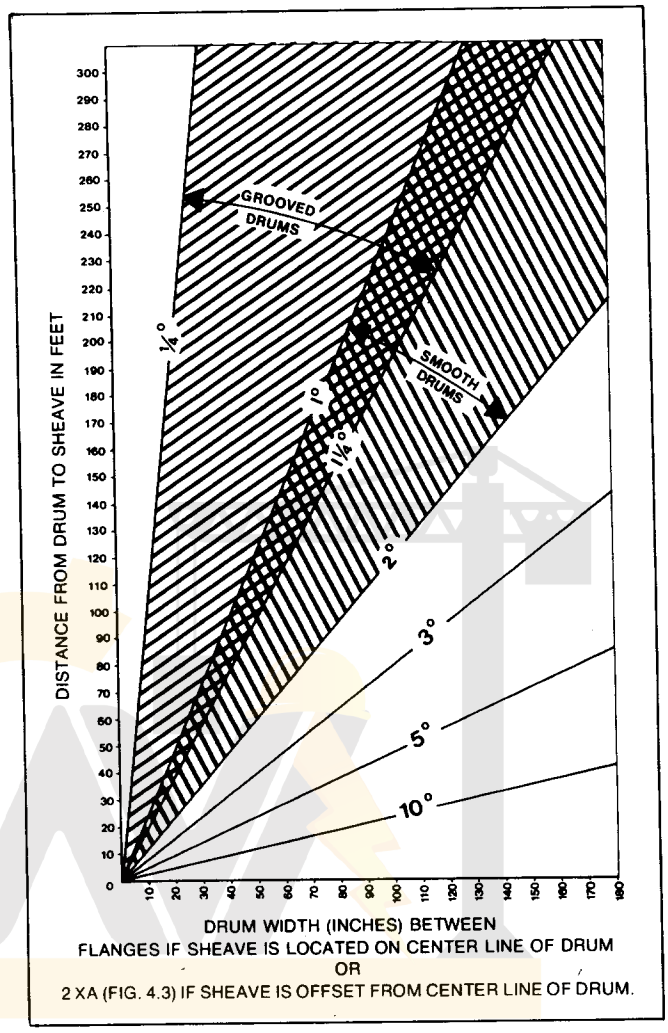




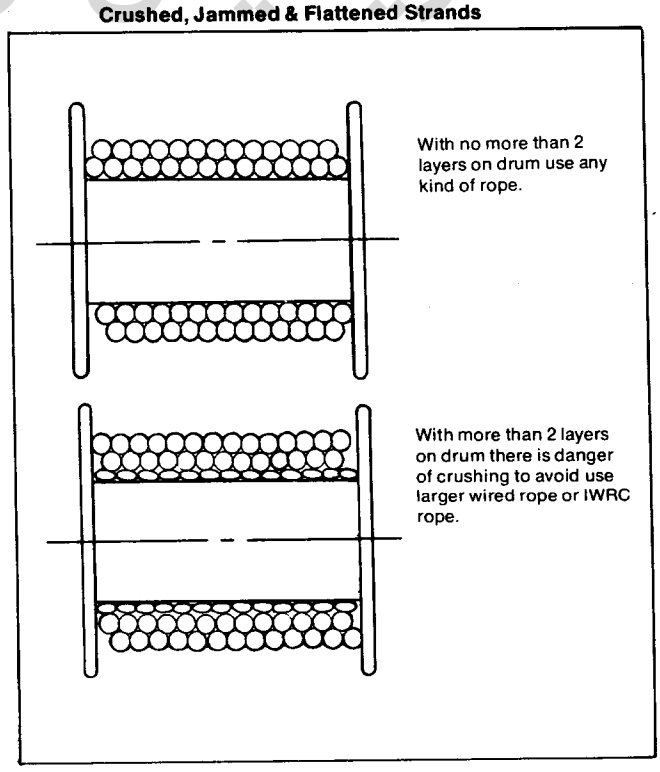
Fleet Angles



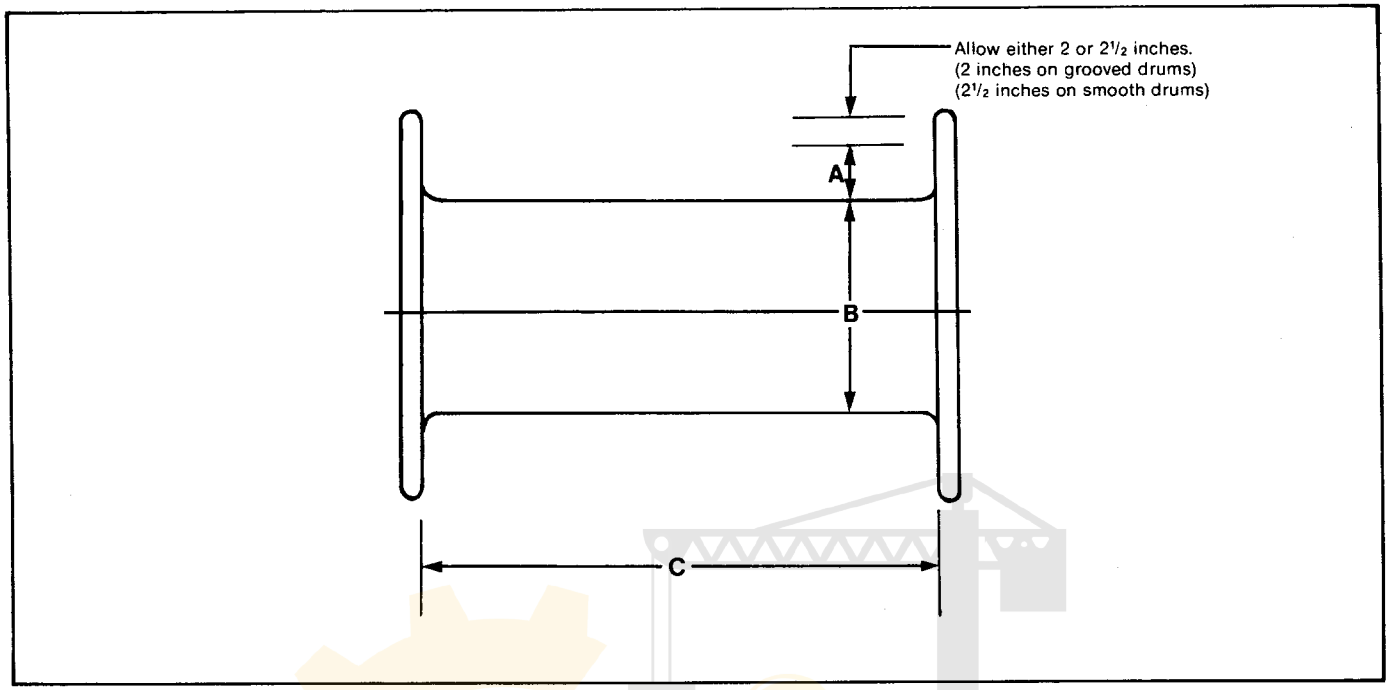
Proper Fleet Angle Ranges for Grooved and Smooth Drums



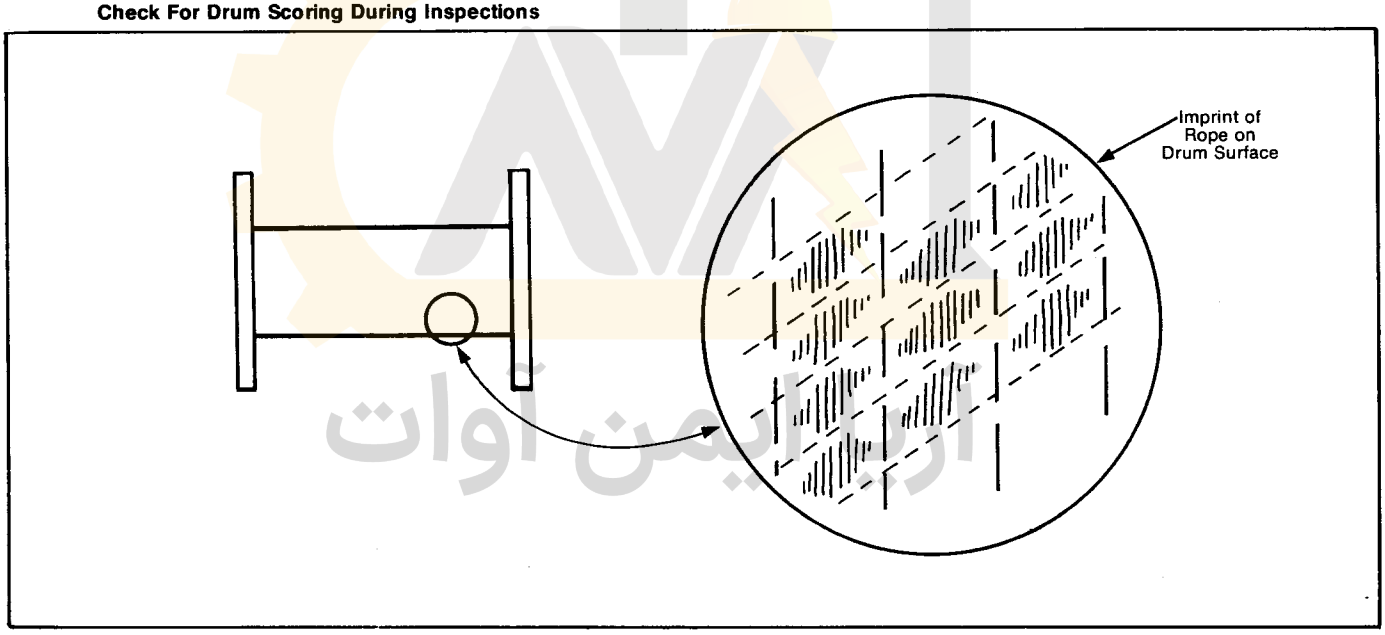
Crushed, Jammed & Flattened Strands



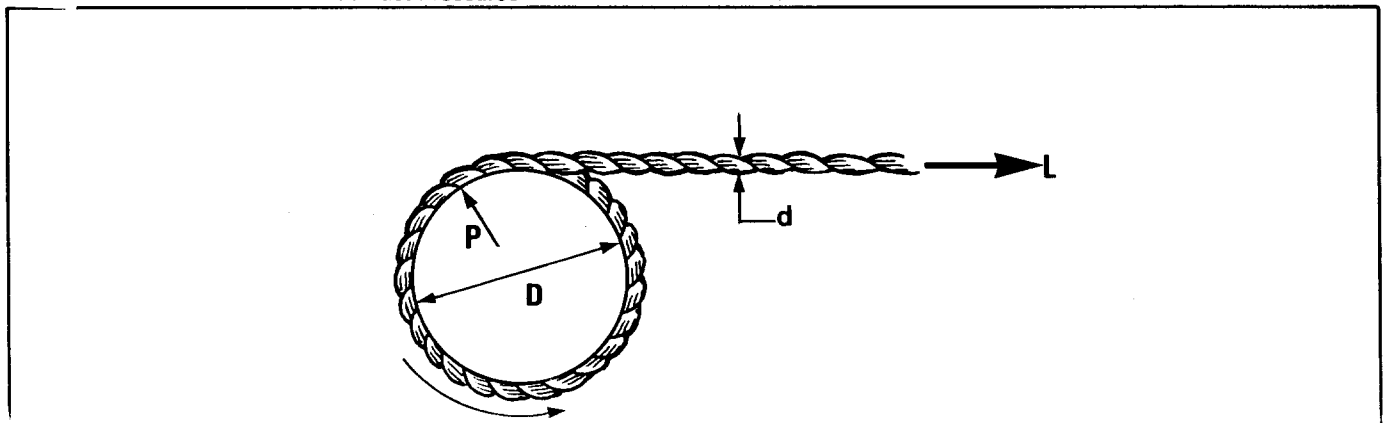
Determination of Drum Capacity



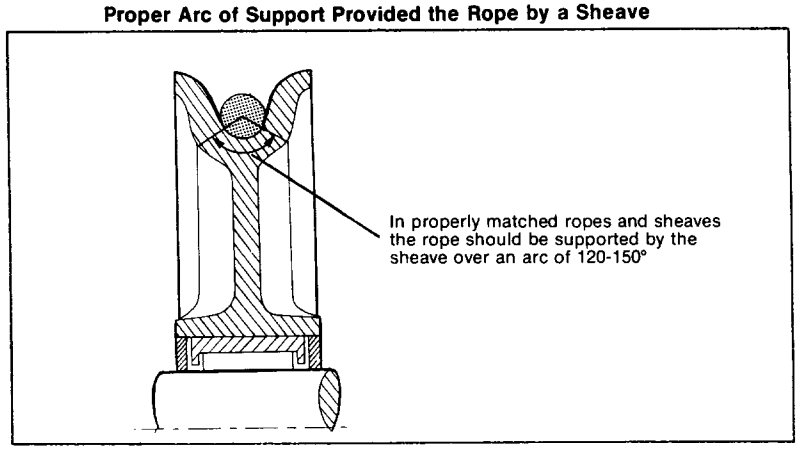
Check For Drum Scoring During Inspections



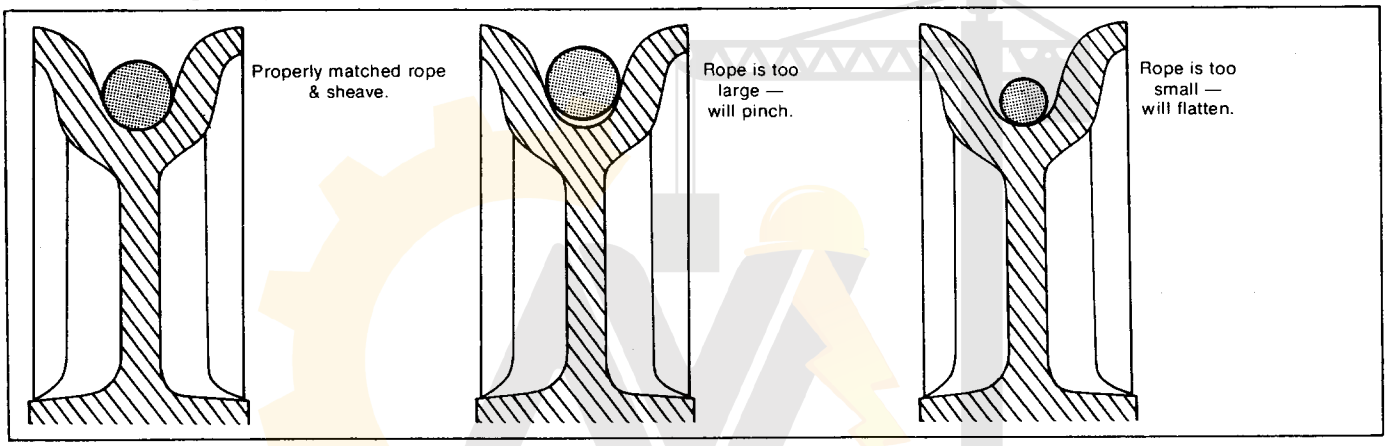
Determination of Drum Contact Pressures



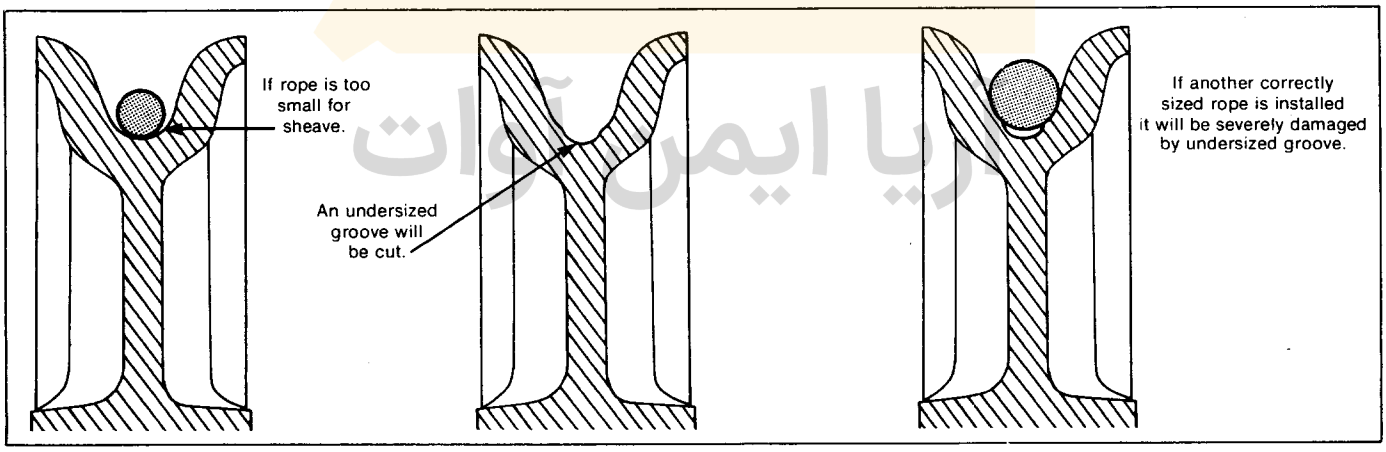
Proper Arc of Support Provided the Rope by a Sheave



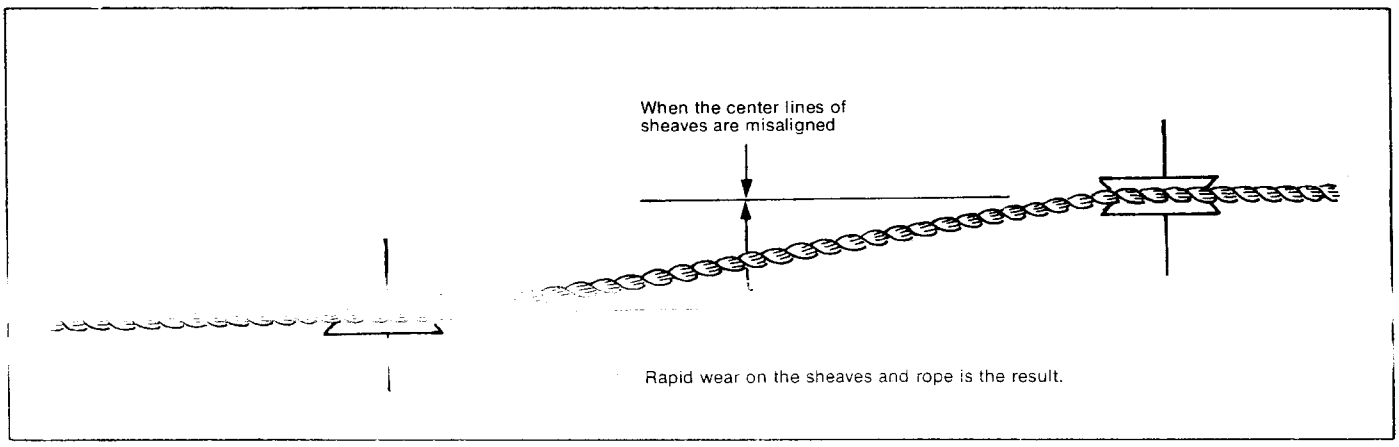
Matching of Ropes and Sheaves



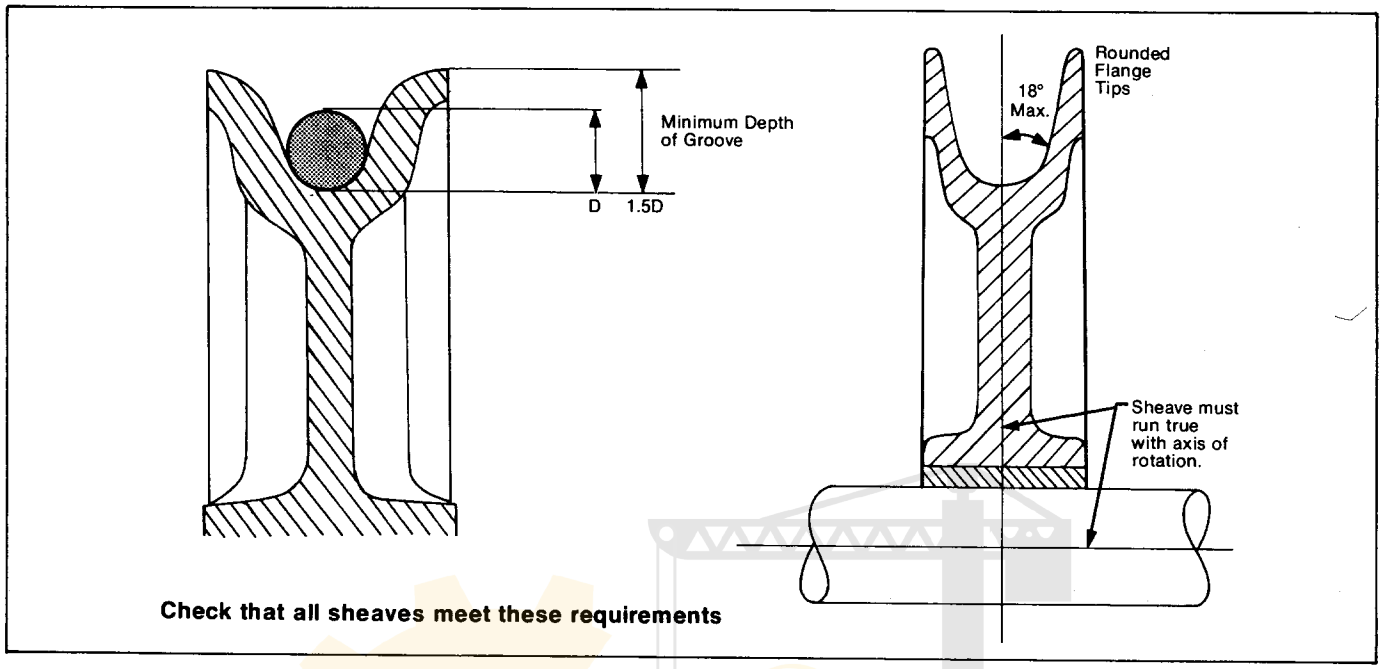
Effect of Improper Match between Rope and Sheave



Effect of Sheave Misalignment

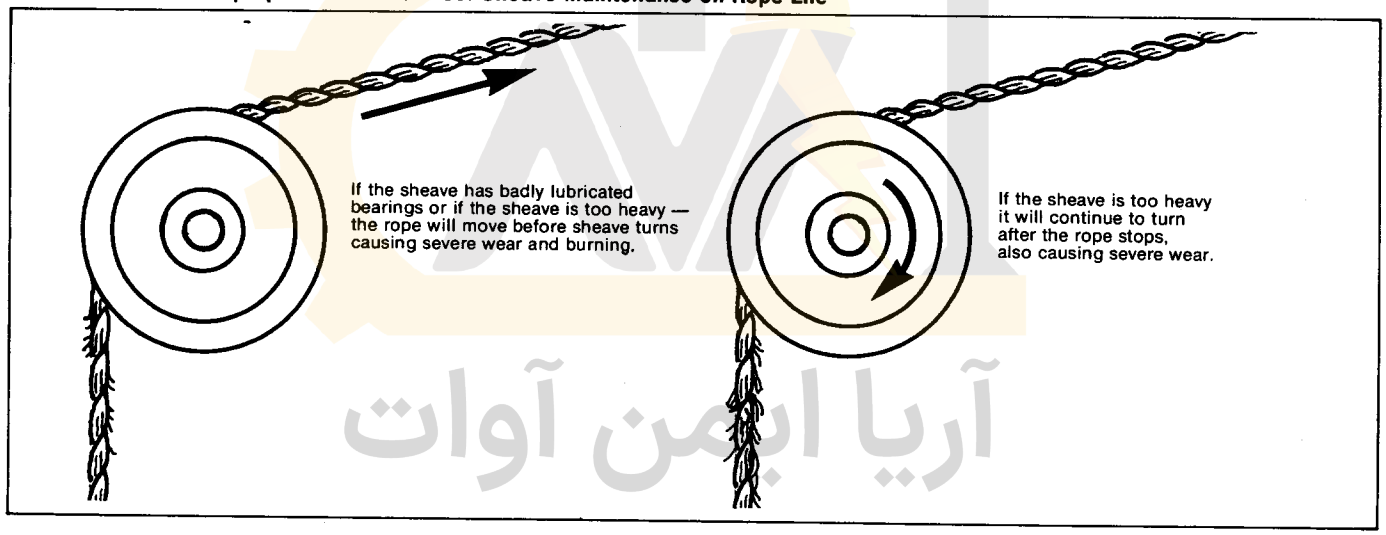


Sheave Requirements

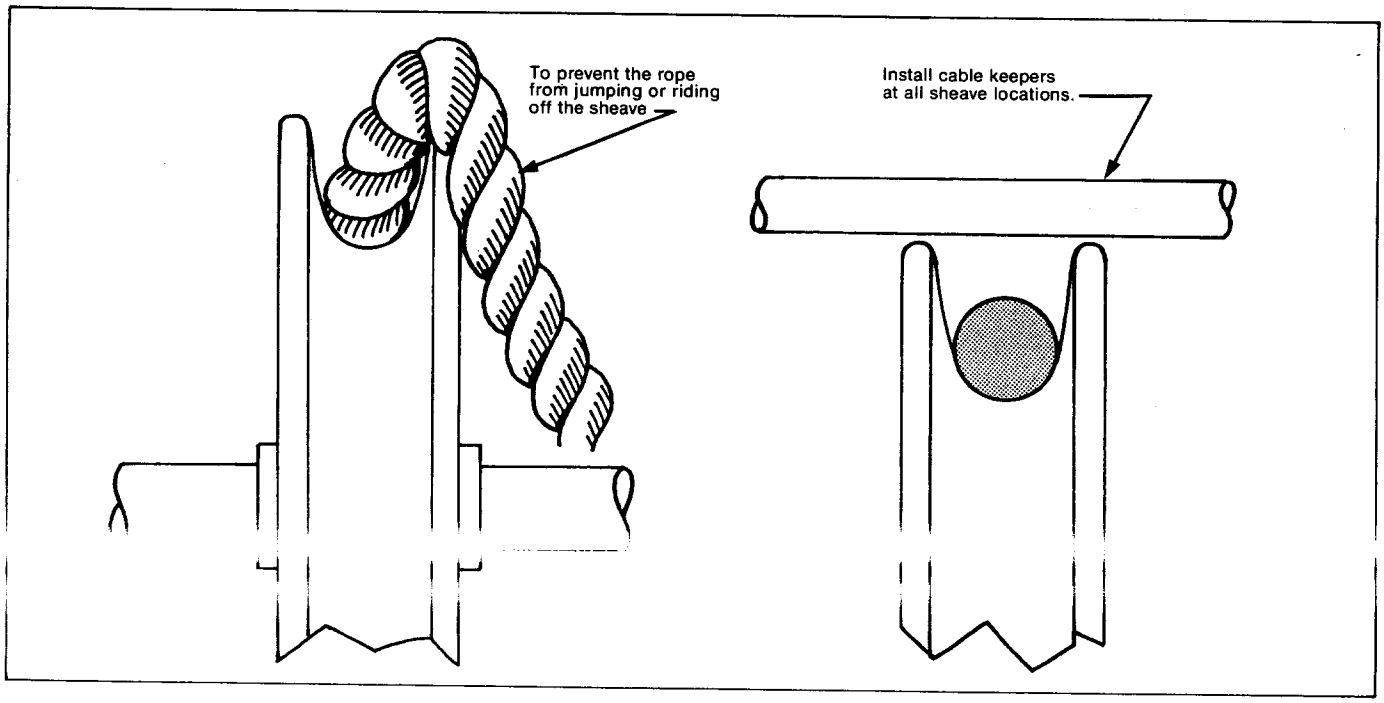


Check that all sheaves meet these requirements

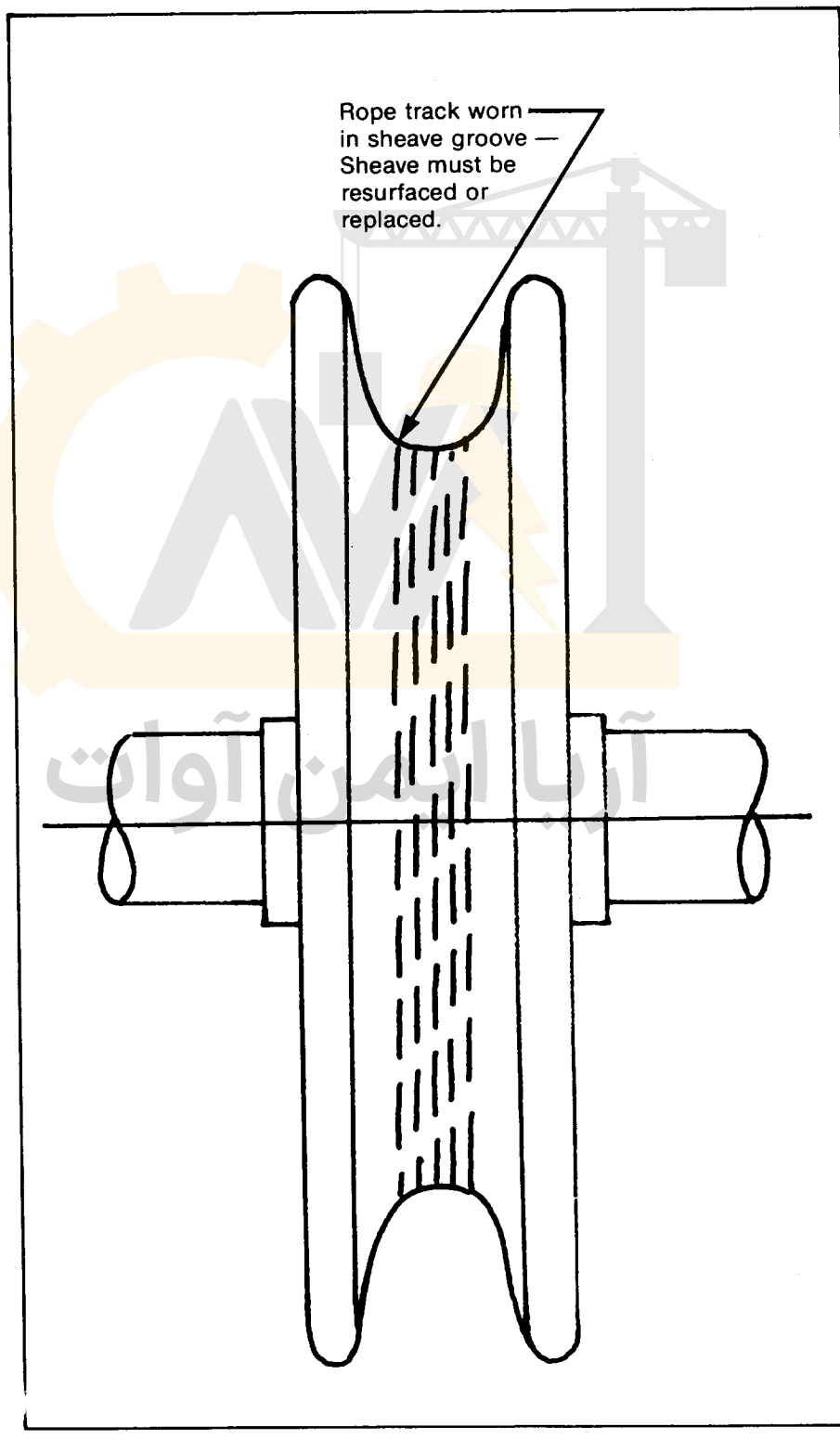
Effect of Improper Sheaves or Poor Sheave Maintenance on Rope Life



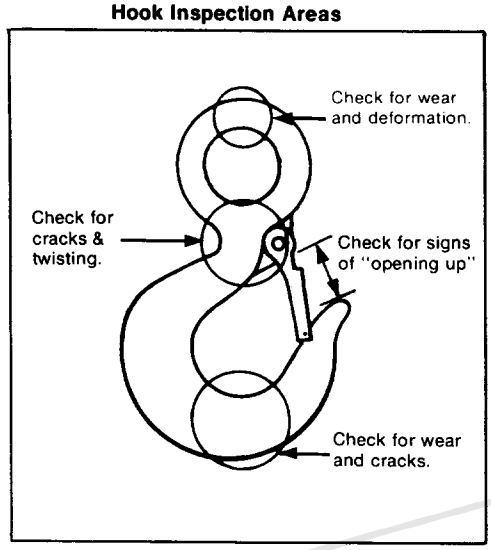
Sheave Cable Keepers



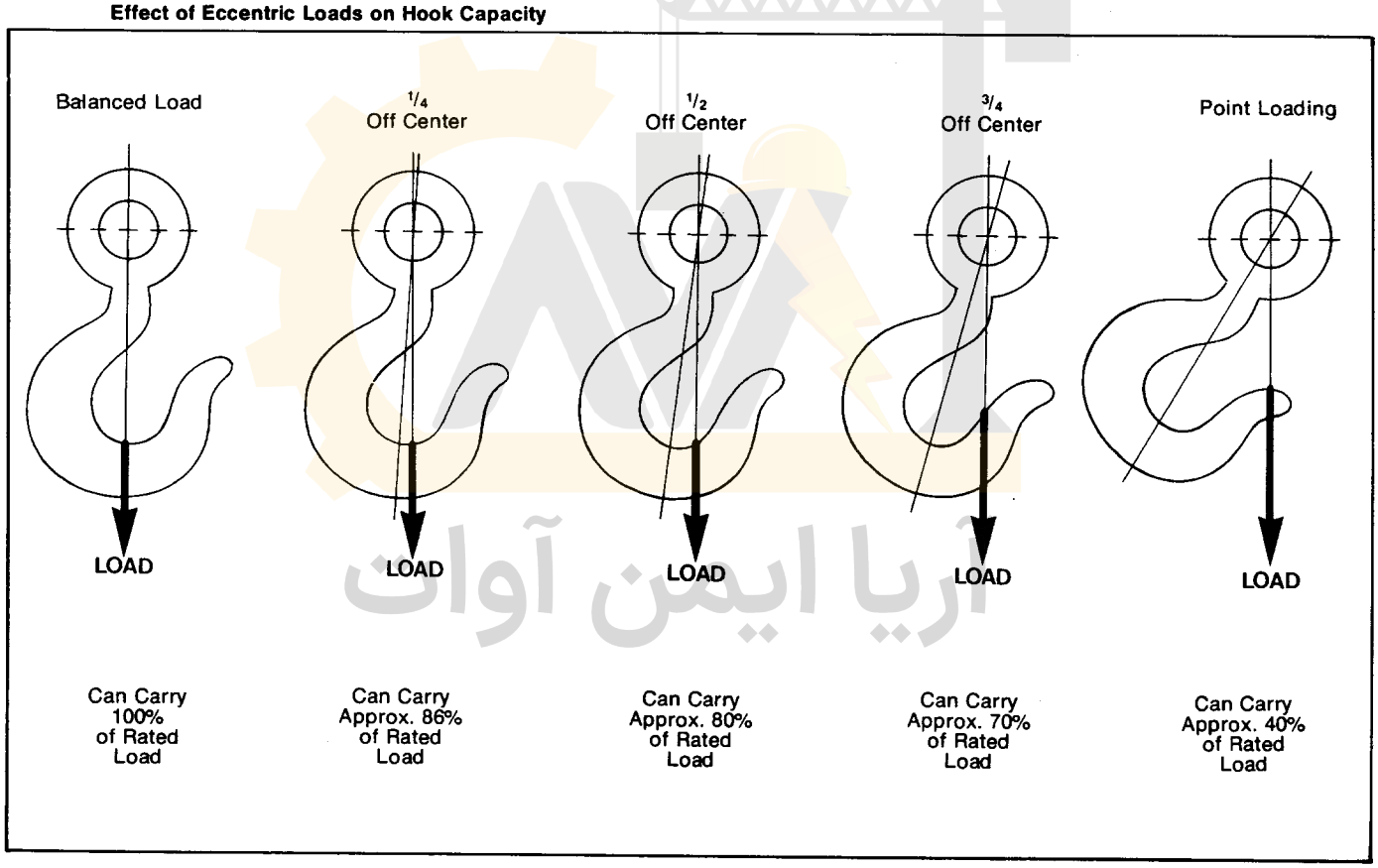
Scored Sheave Groove



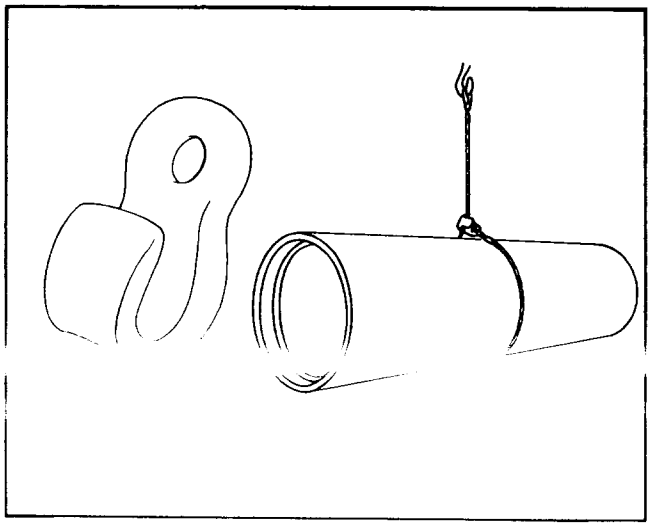
Hook Inspection Areas



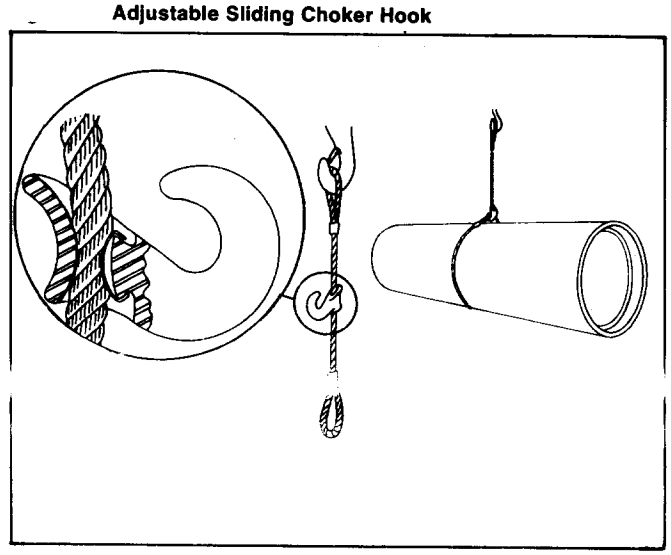
Effect of Eccentric Loads on Hook Capacity



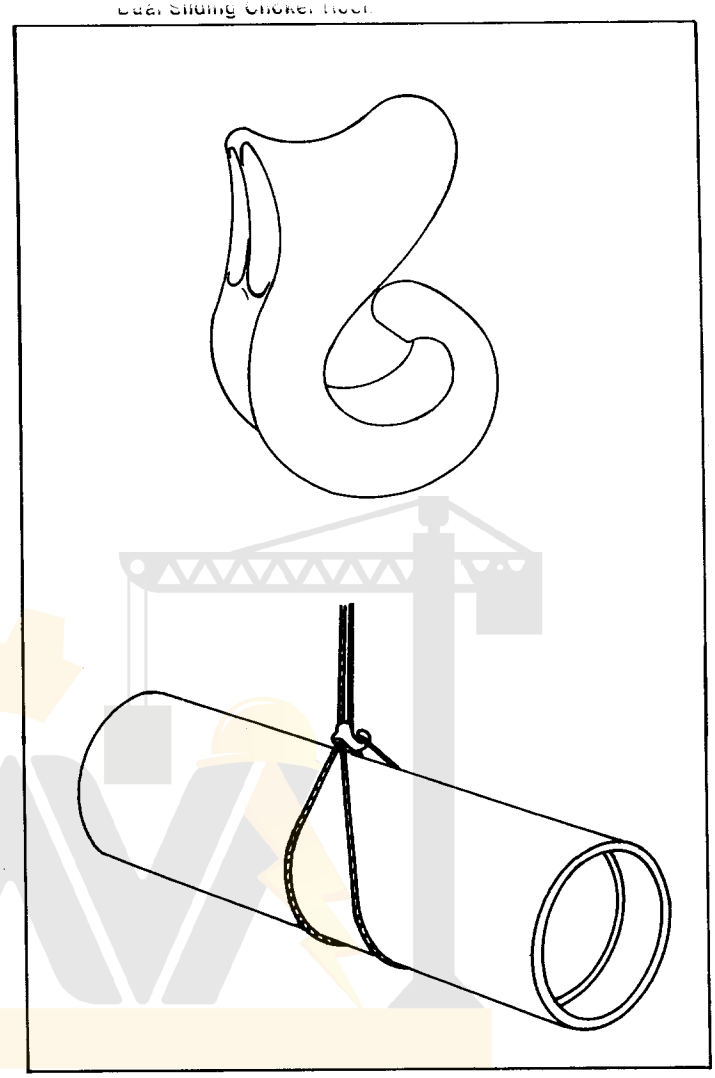
Standard Choker Hook



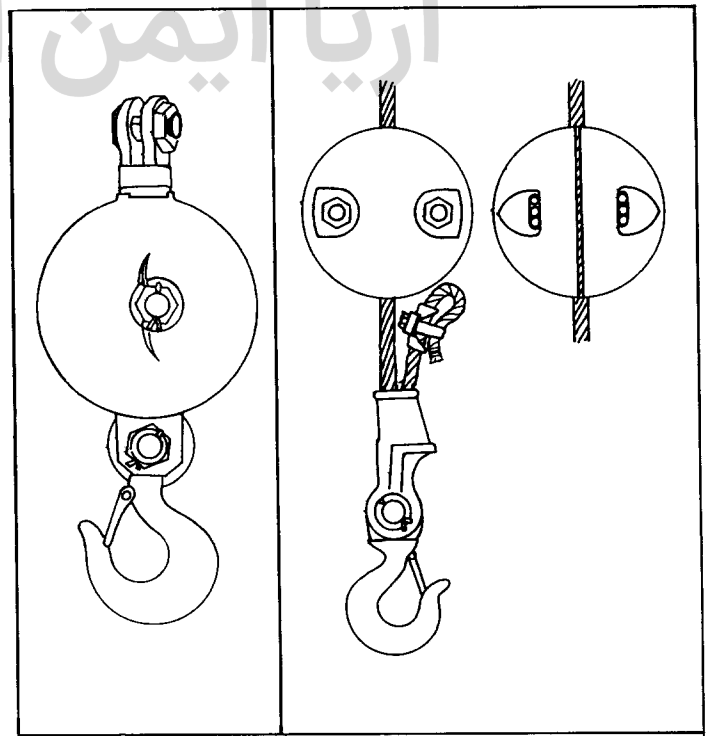
Adjustable Sliding Choker Hook



Bail Sliding Choker Hook

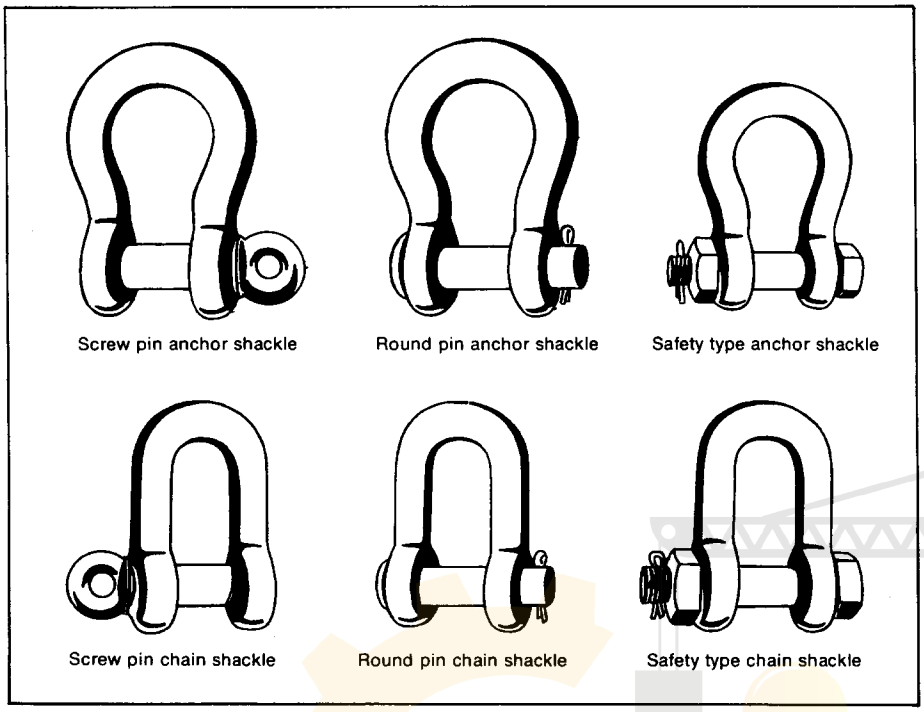


'Headache' Ball

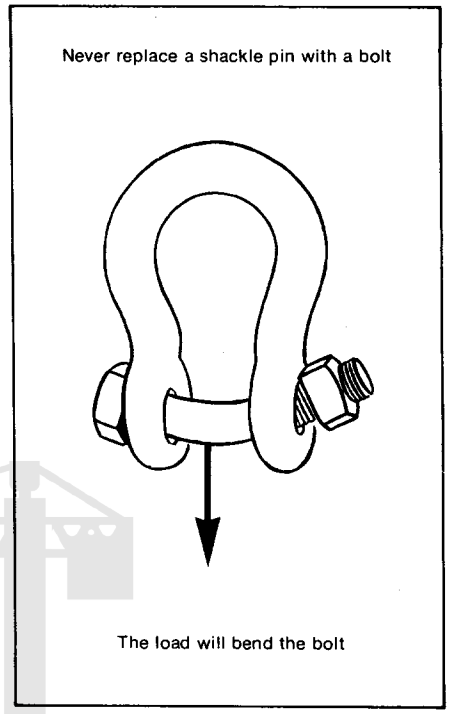


Headache Ball Must Be Securely Attached to the Hook or the Rope

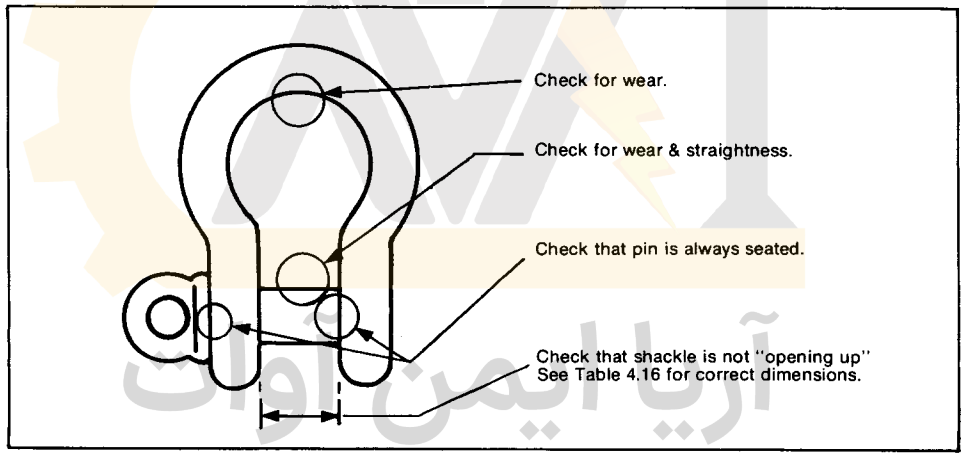
Typical Shackles



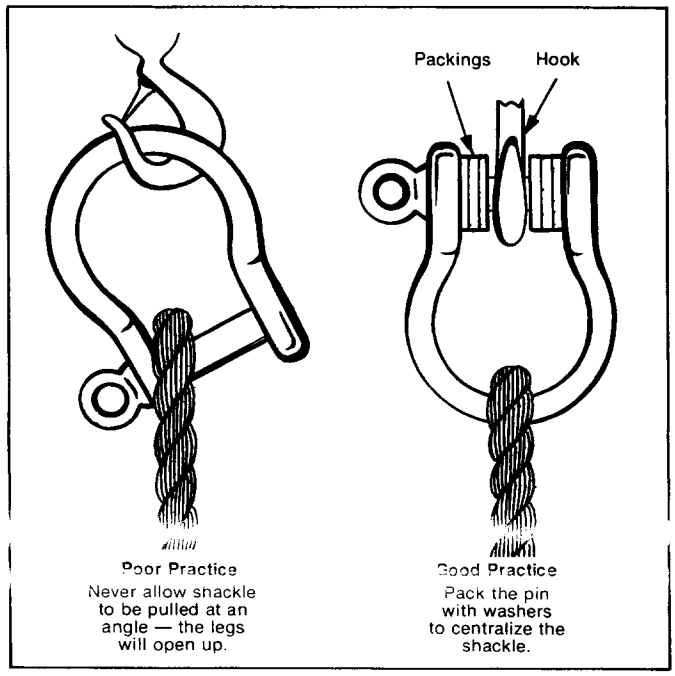
eplacing Shackle Pins



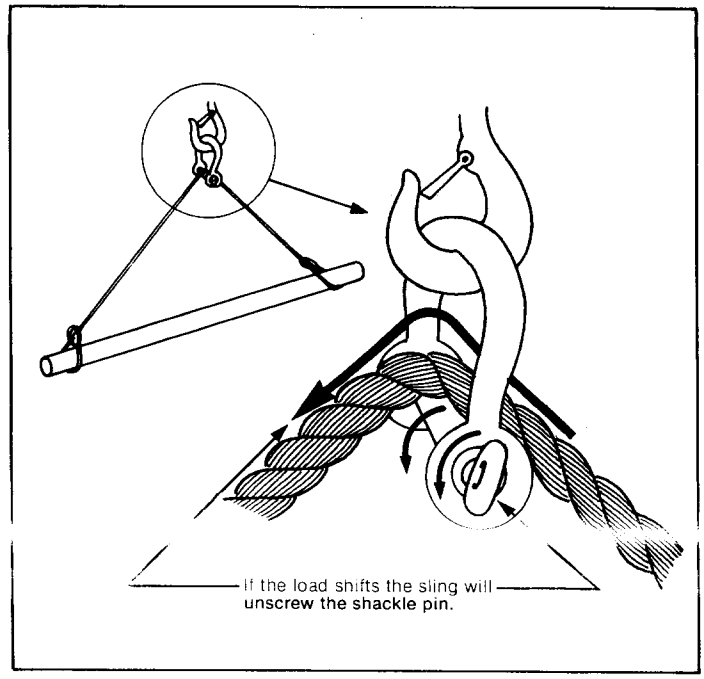
Shackle Inspection Areas



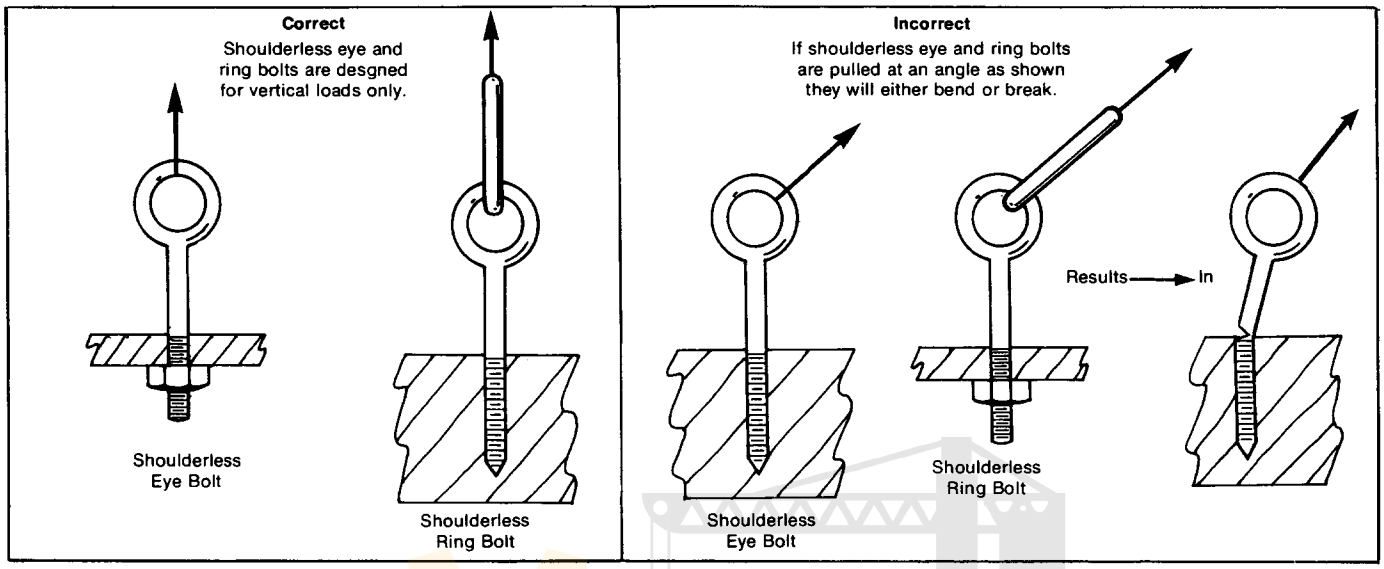
Eccentric Shackle Loads



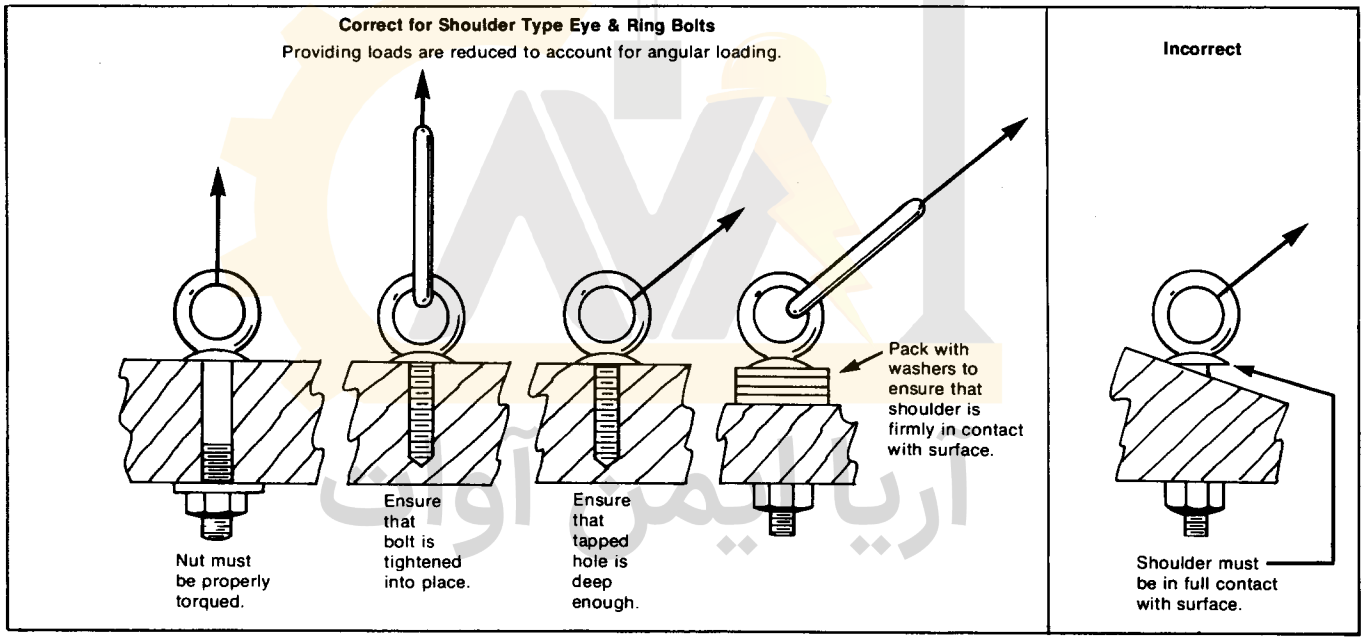
Do Not Use Screw Pin Shackles if the Pin can Roll Under Load and Unscrew



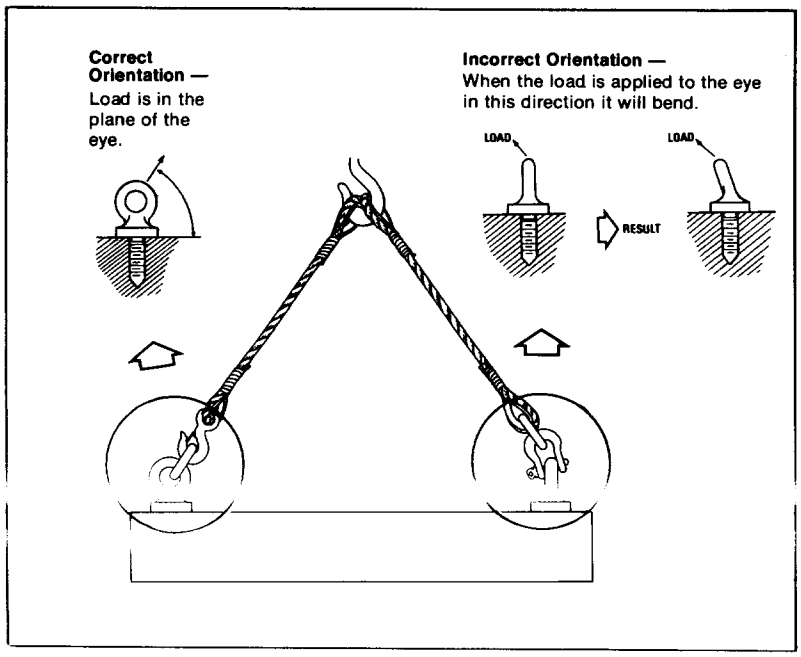
Use of Eye Bolts



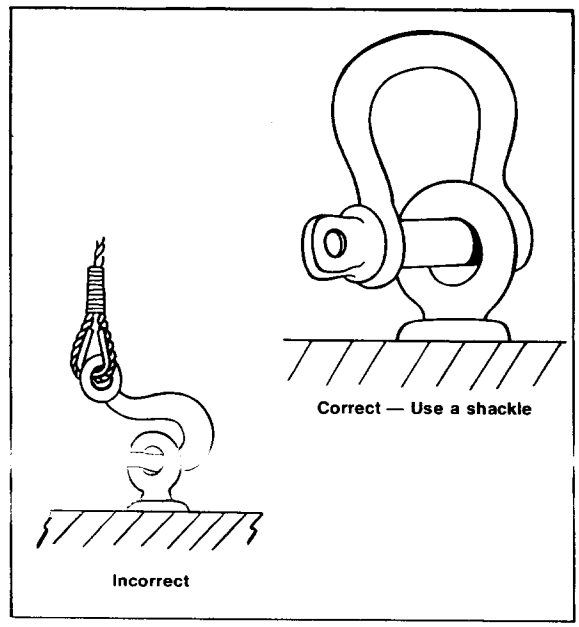
Use of Shoulder Type Eye and Ring Bolts



Orientation of Eye Bolts

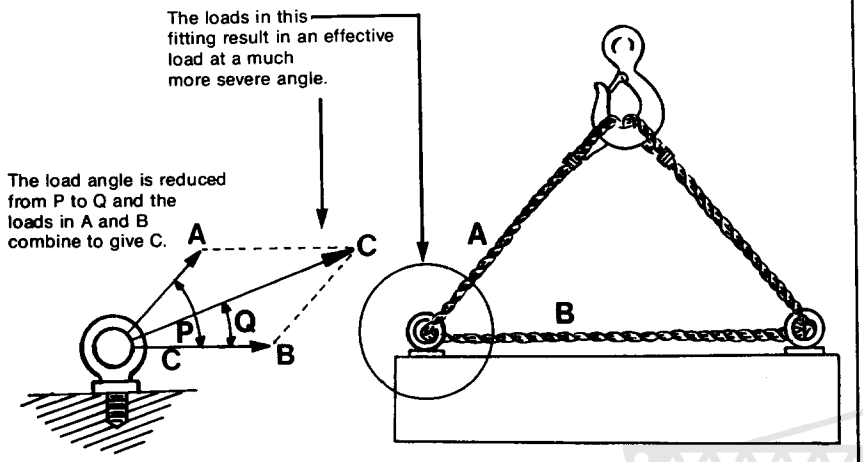


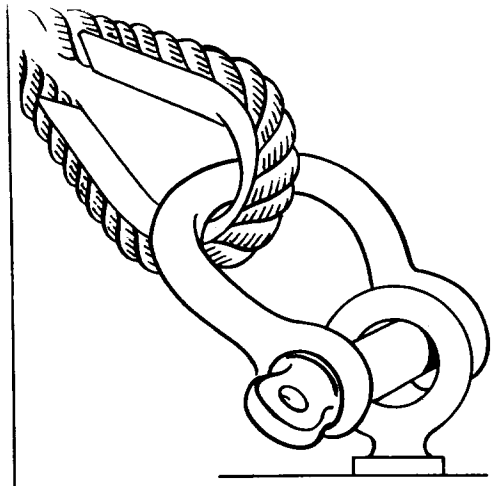
Never Insert the Point of a Hook in an Eye Bolt



Lifting With Eye Bolts

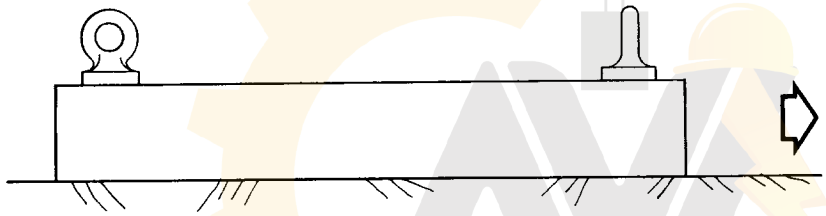
Never run a sling through a pair of eye bolts as shown.



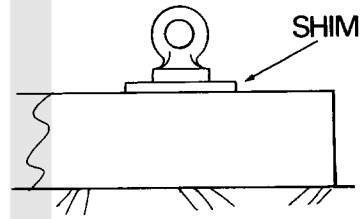


Use a pair of shackles instead.

Alignment of Eye Bolts

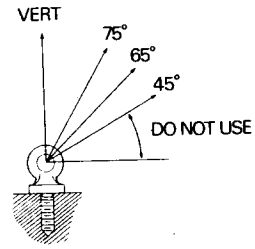


When the eye bolts cannot be aligned.



Use a shim or washer.

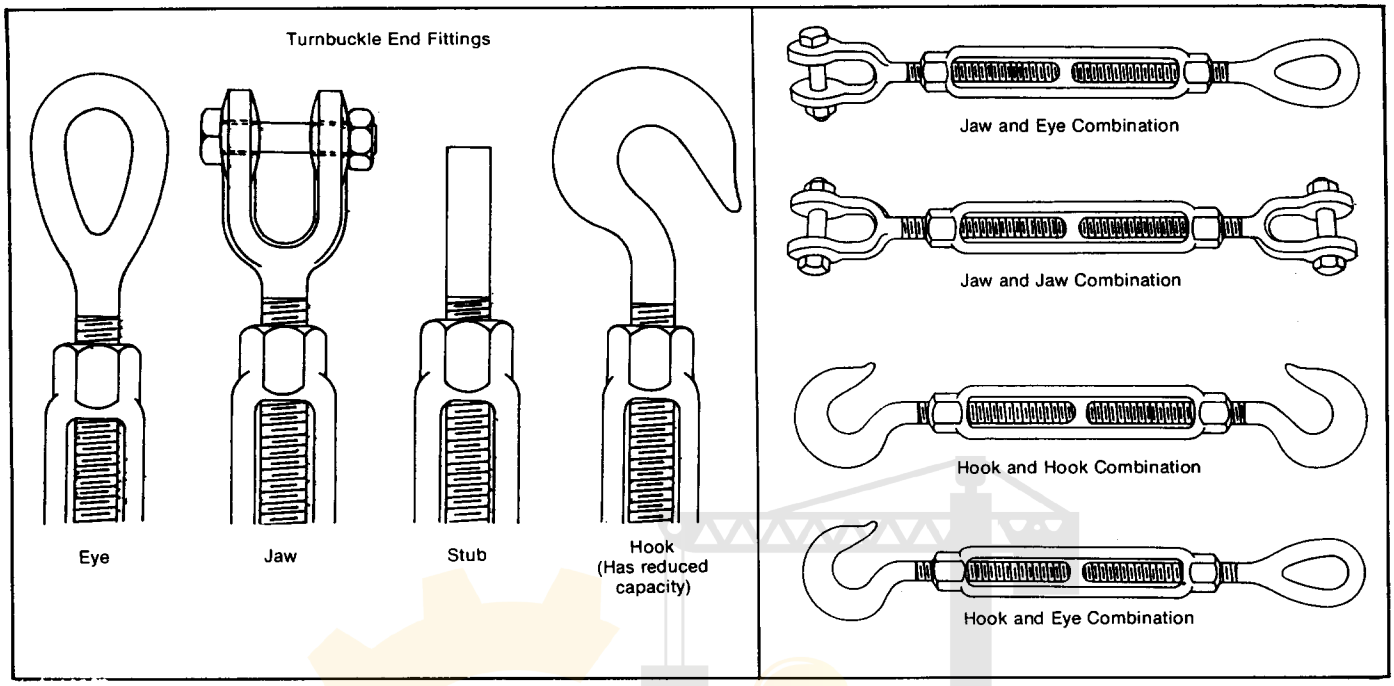
EYE BOLTS
— Shoulder Type Only
— Forged Carbon Steel



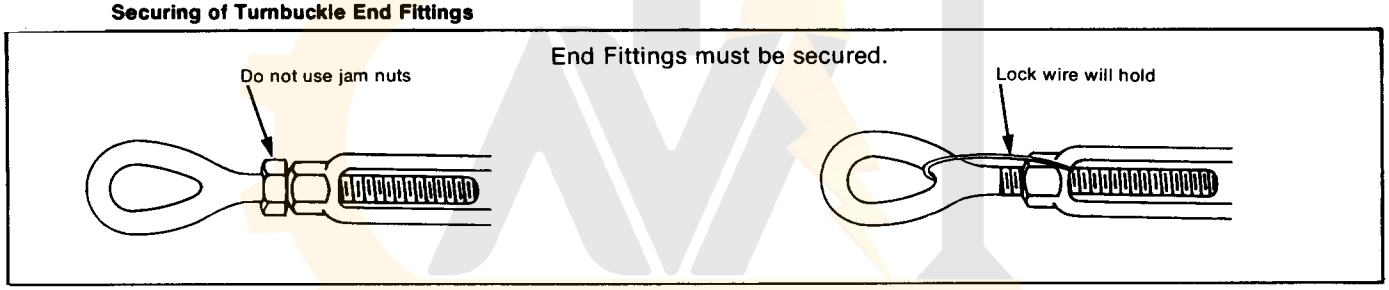
Stock Diameter (Inches)	SAFE WORKING LOADS (LBS) CORRESPONDING TO ANGLE OF PULL				
	Vertical	75°	60°	45°	Less than 45°
1/4 5/16 3/8 1/2 5/8 3/4 7/8 1 1 1/4 1 1/2	500 800 1,200 2,200 3,500 5,200 7,200 10,000 15,200 21,400	Reduce Vertical Loads By 45%.	Reduce Vertical Loads By 65%.	Reduce Vertical Loads By 75%.	NOT RECOMMENDED

Note: S.W.L. for plain (shoulderless) eye bolts are same as for shoulder bolts under vertical load. Angular loading is not recommended.

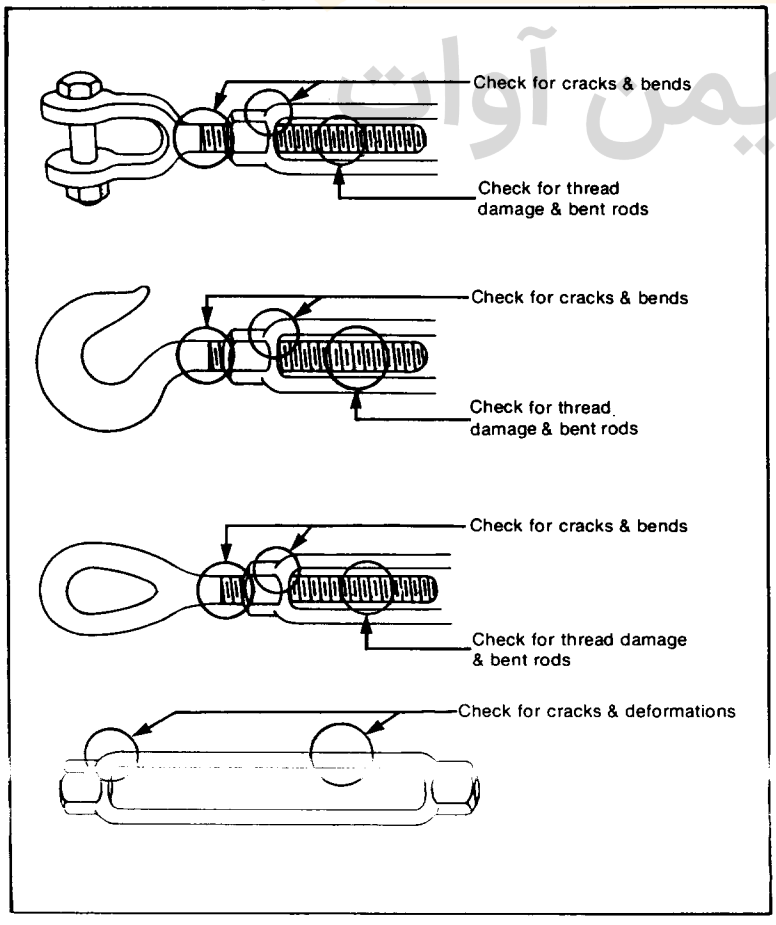
Turnbuckles



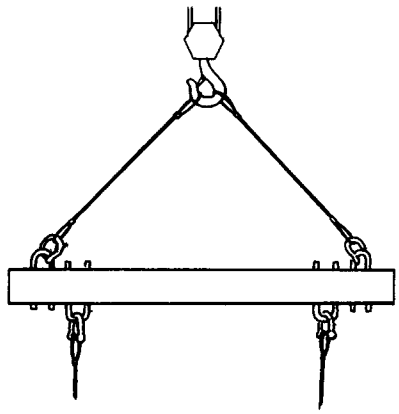
Securing of Turnbuckle End Fittings



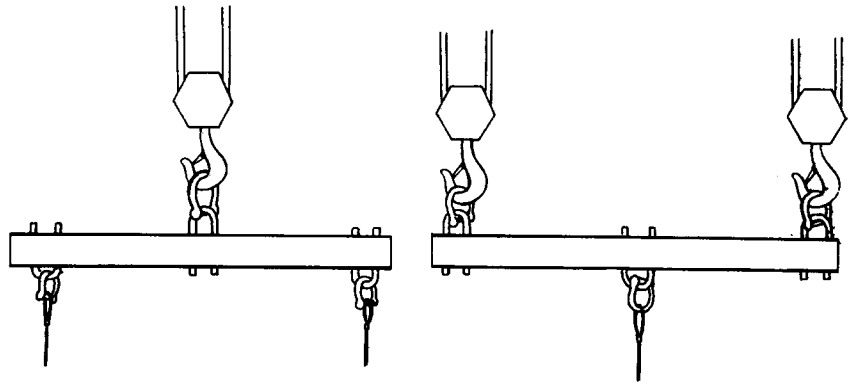
Turnbuckle Inspection Areas



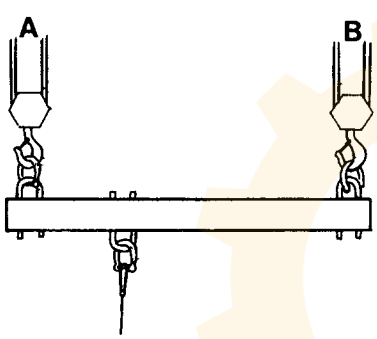
Spreader and Equalizer Beams

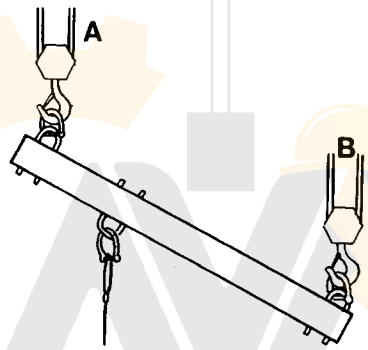


Spreader Beam

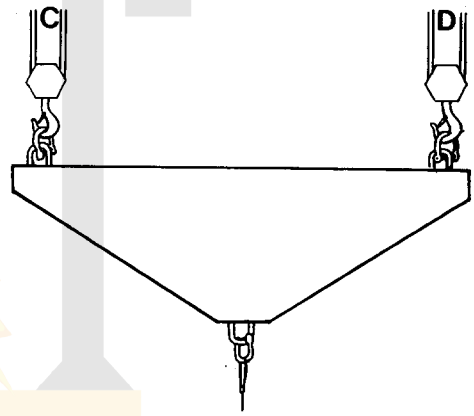


Equalizer Beams



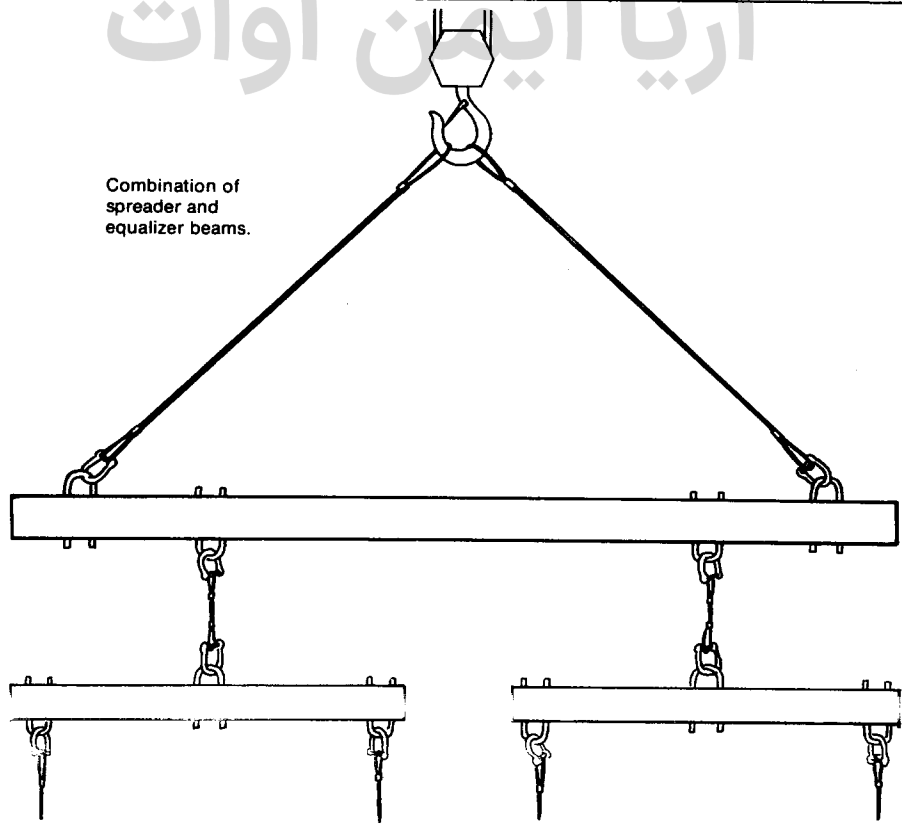


Loads in A & B do not change when beam angle changes.

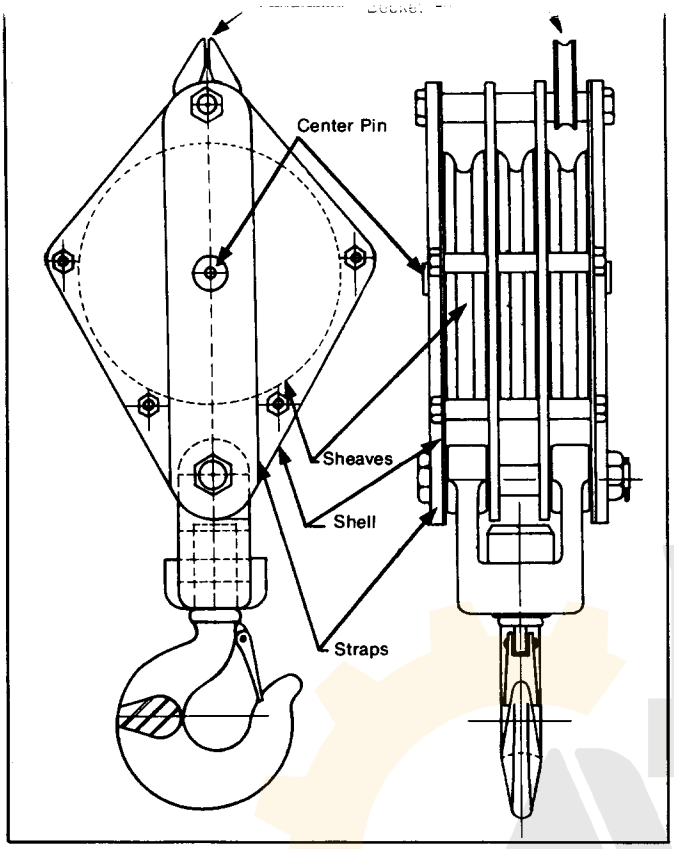


Loads in C & D will change if beam angle changes.

Combination of spreader and equalizer beams.



Typical Wire Rope Block



Sheave Bearing Configurations

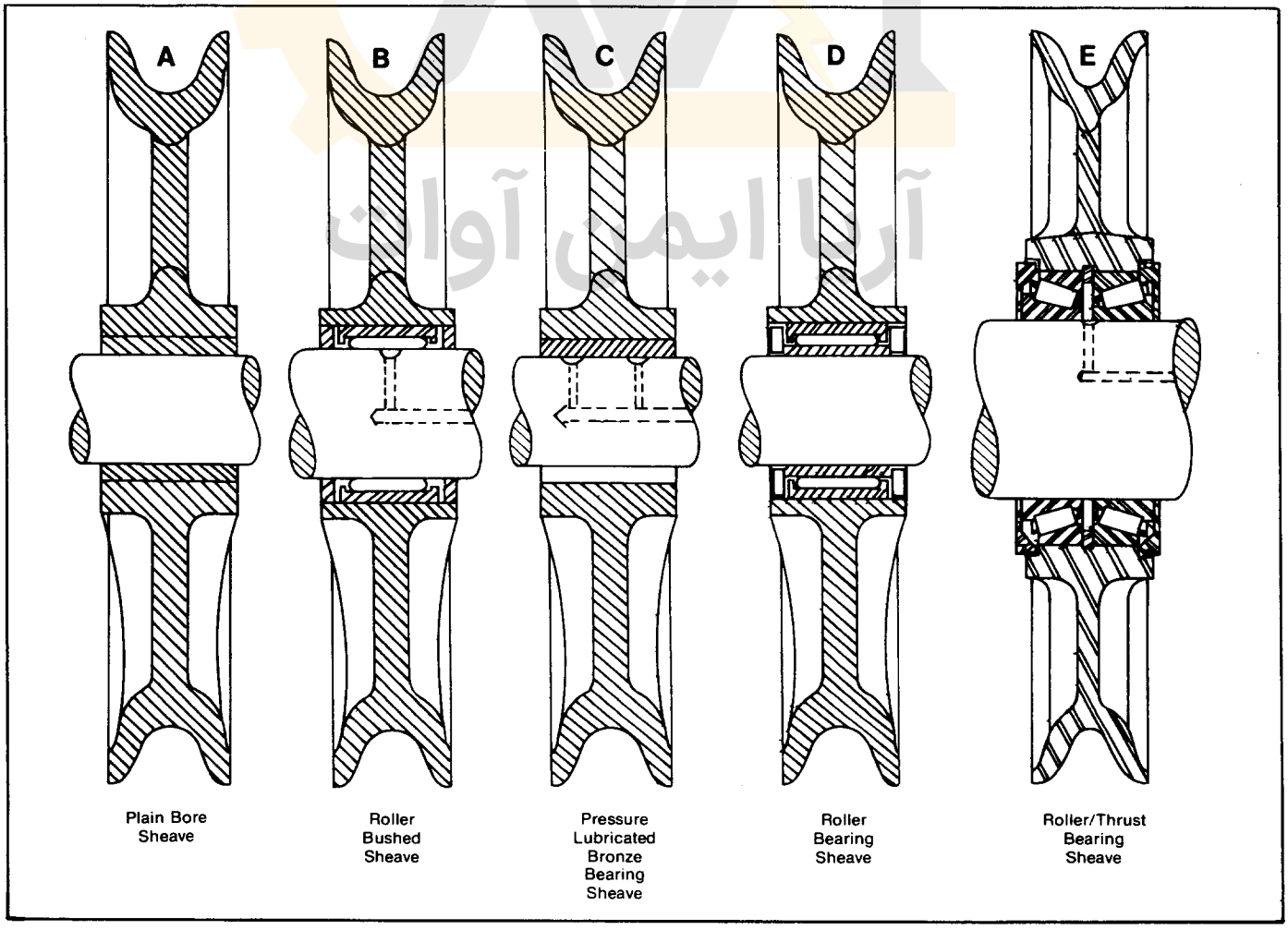


Fig. 4.43 Typical Snatch Blocks

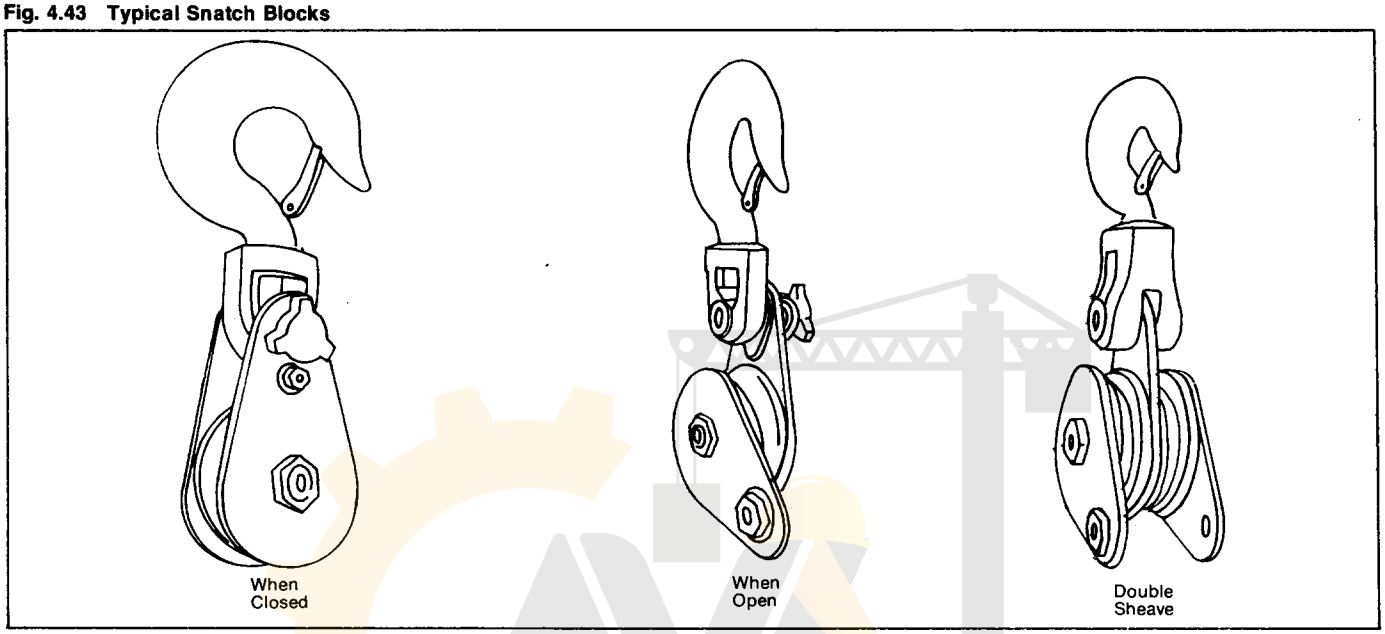
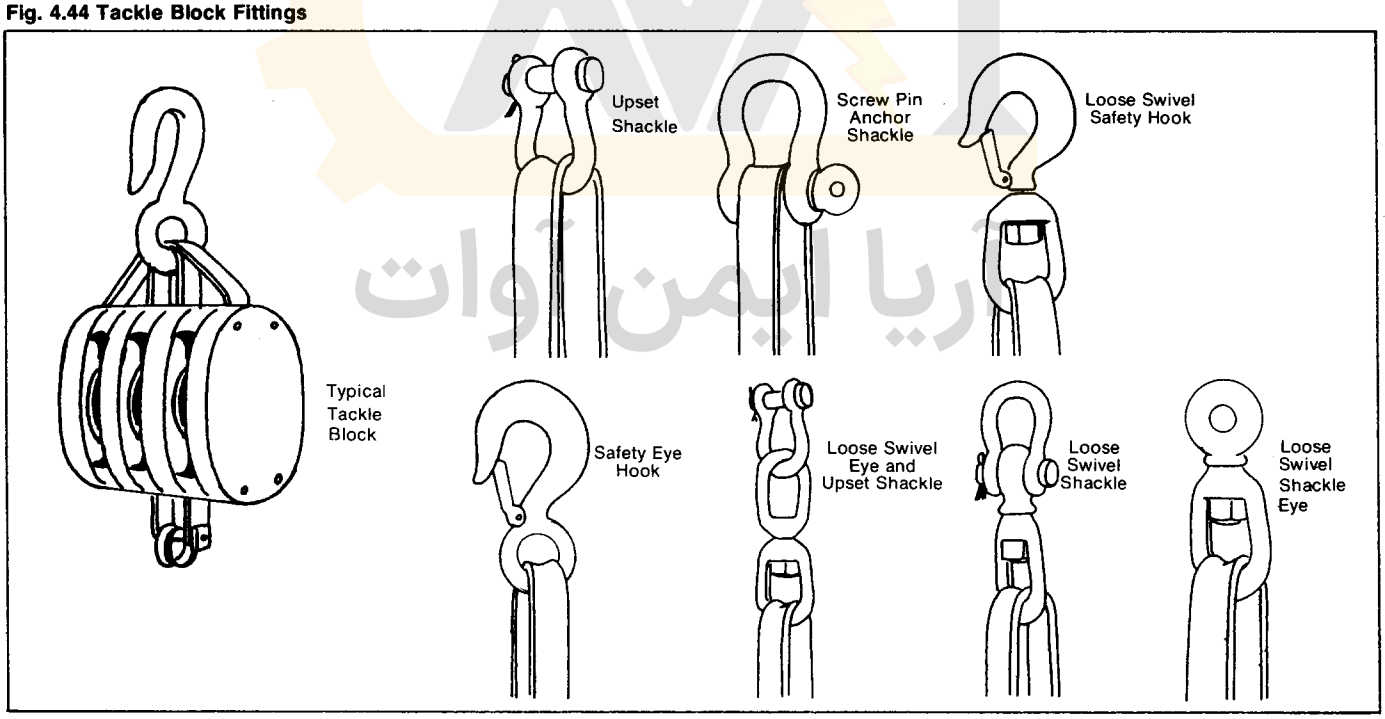
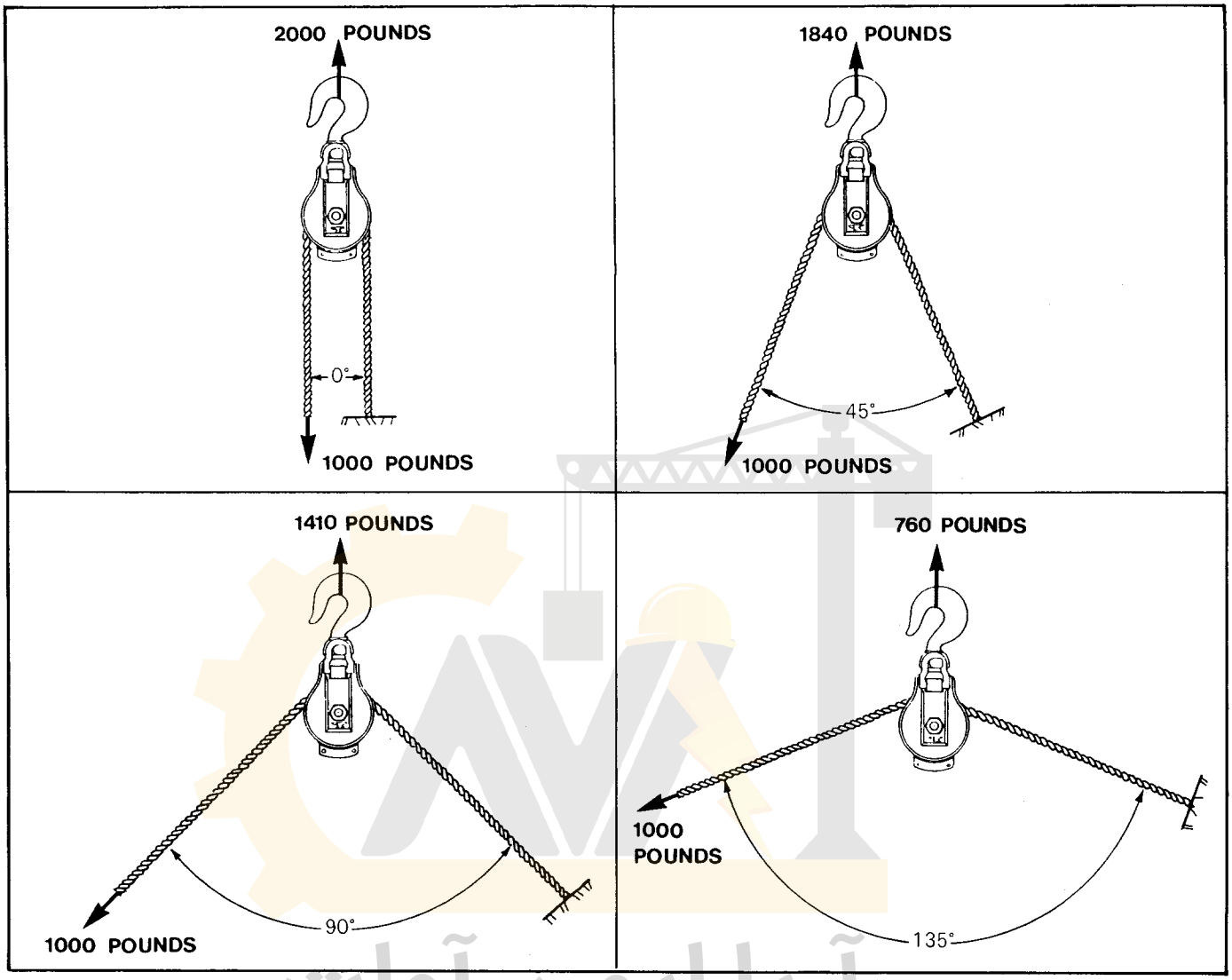


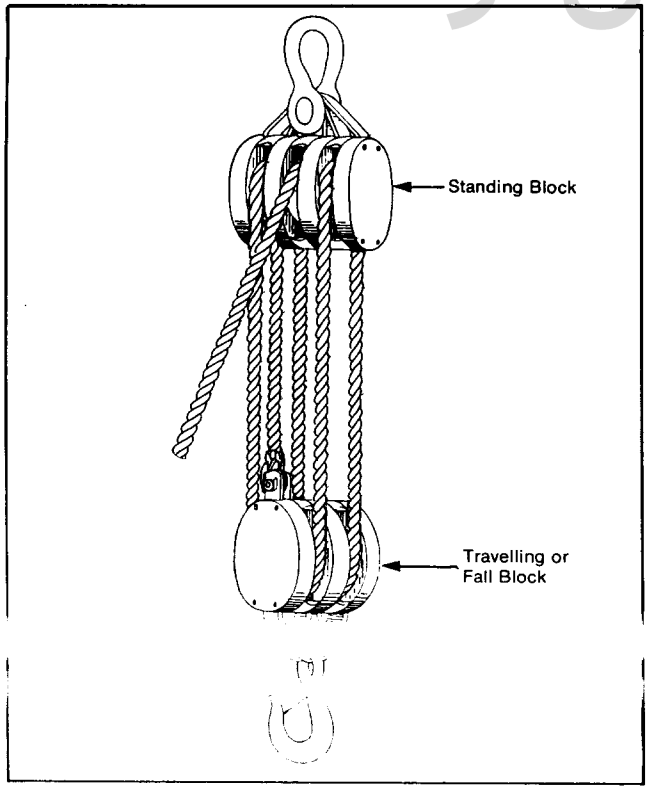
Fig. 4.44 Tackle Block Fittings



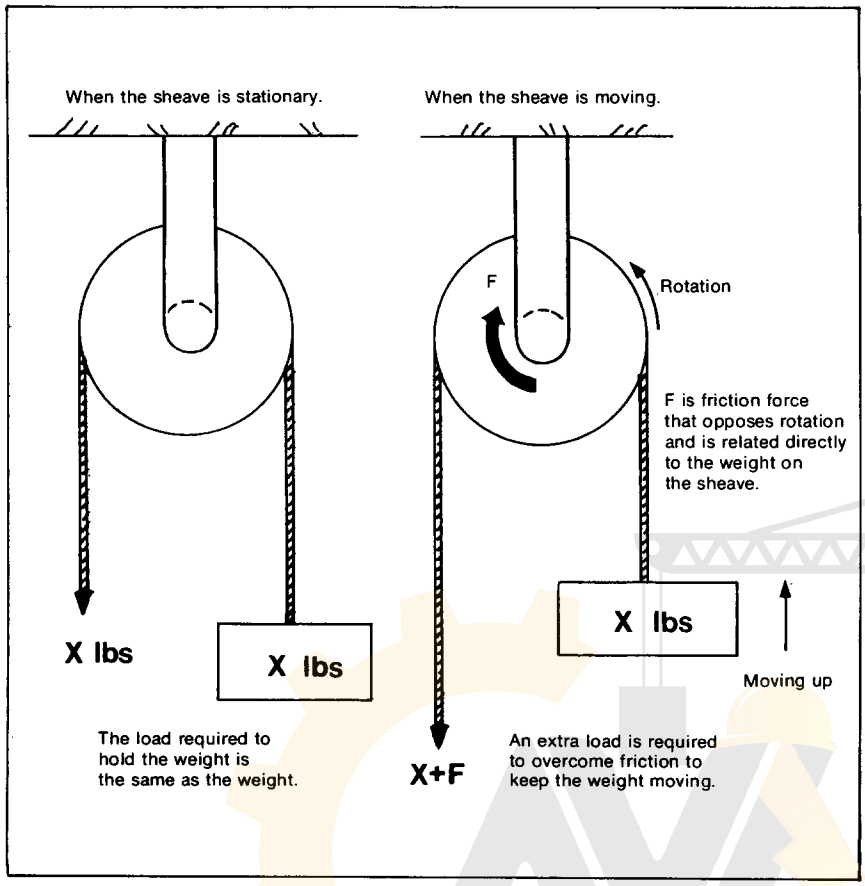
Variation of Snatch Block Loads with Rope Angle



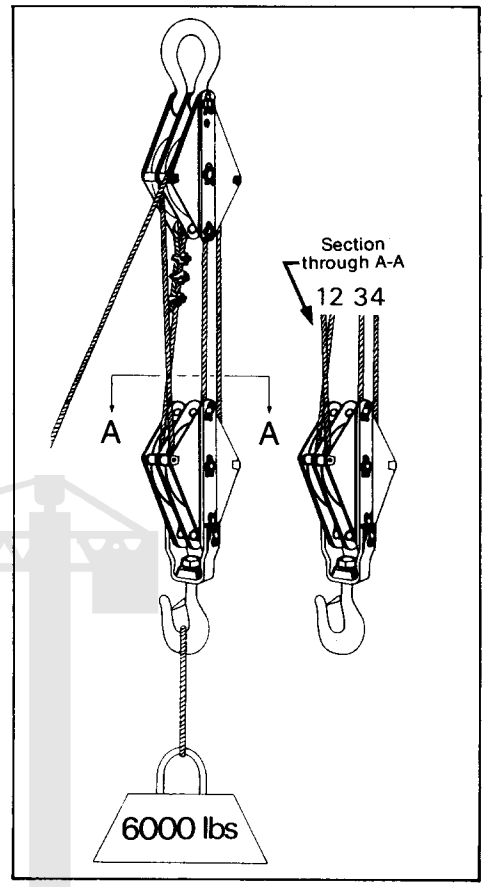
Tackle Block Nomenclature



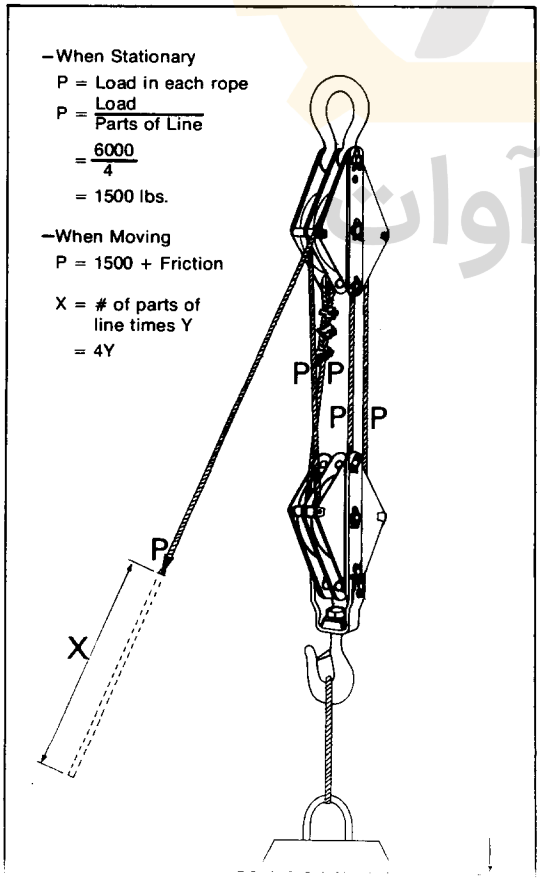
Effect of Sheave Friction



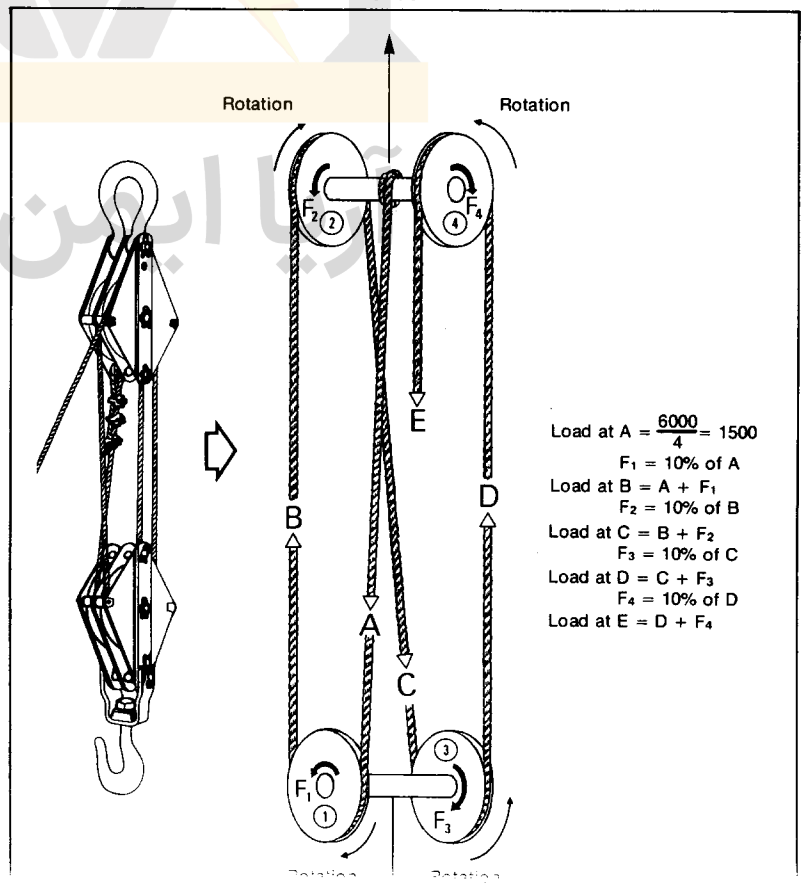
Determination of Parts of Line



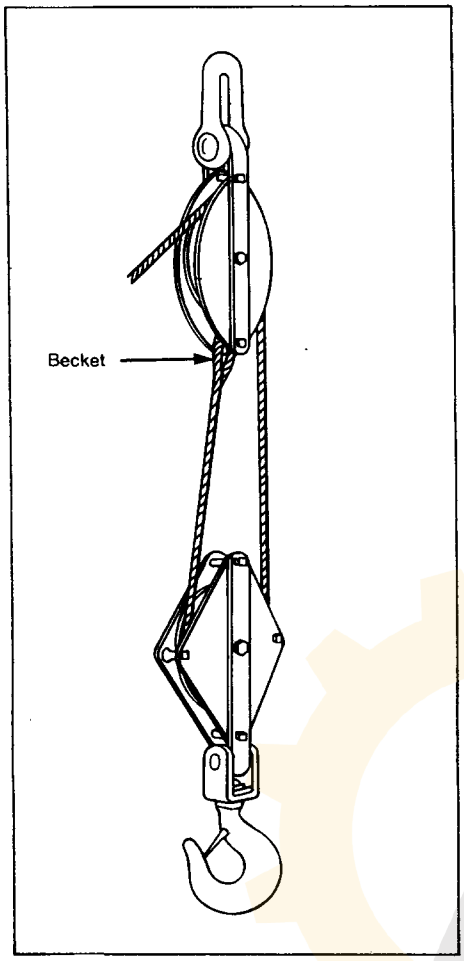
Effect of Mechanical Advantage



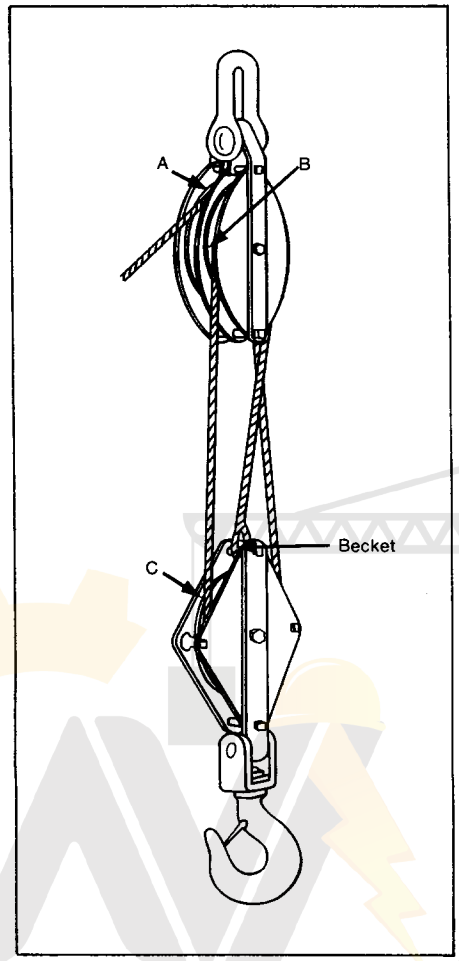
Determination of Sheave Loads



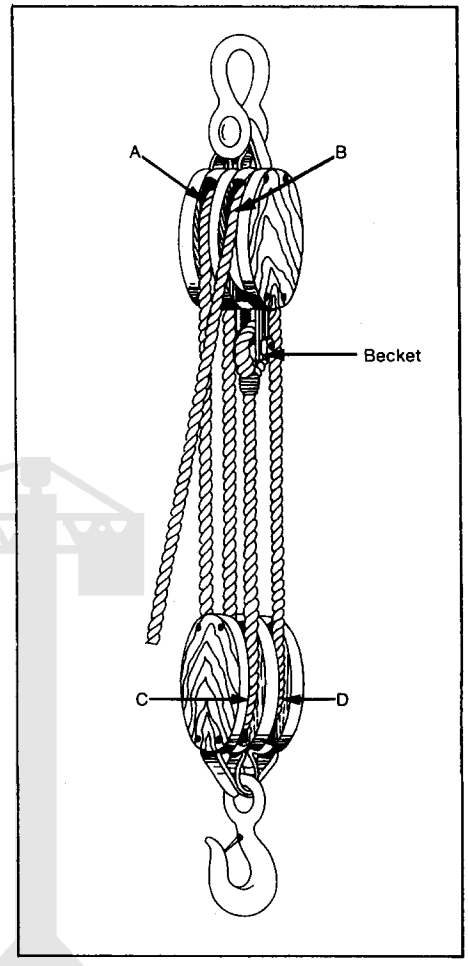
2-Part Line



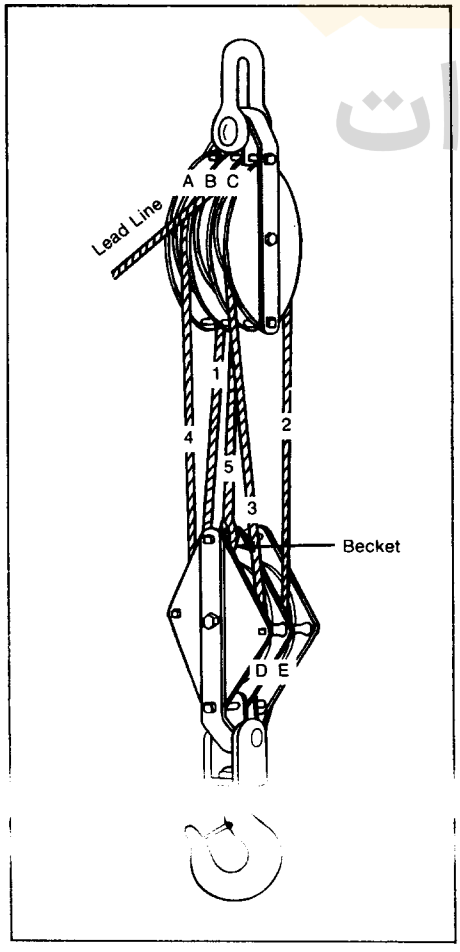
3-Part Line



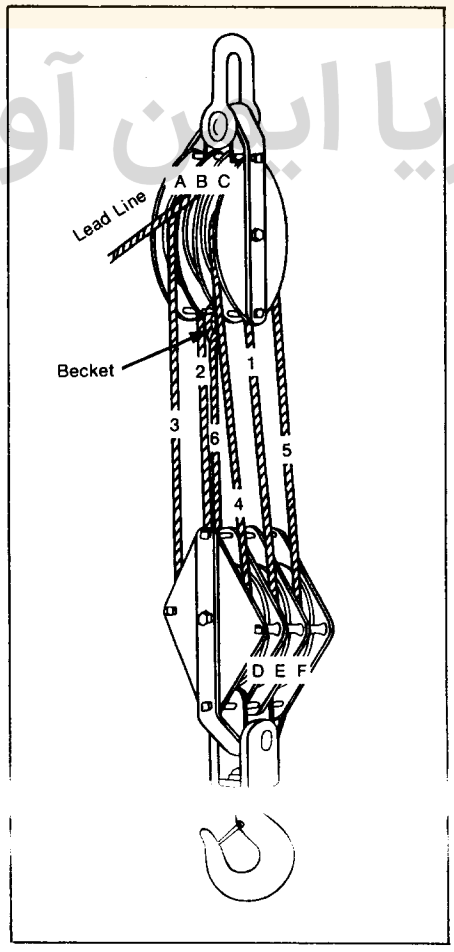
4-Part Line



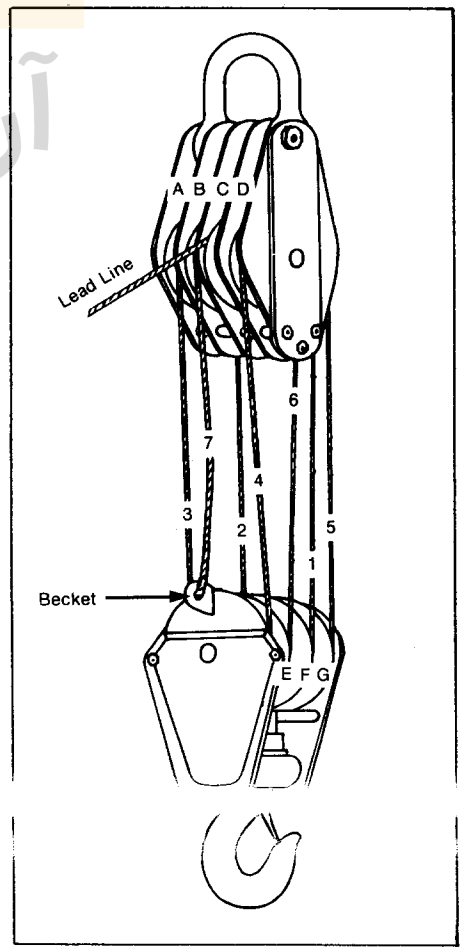
5-Part Line



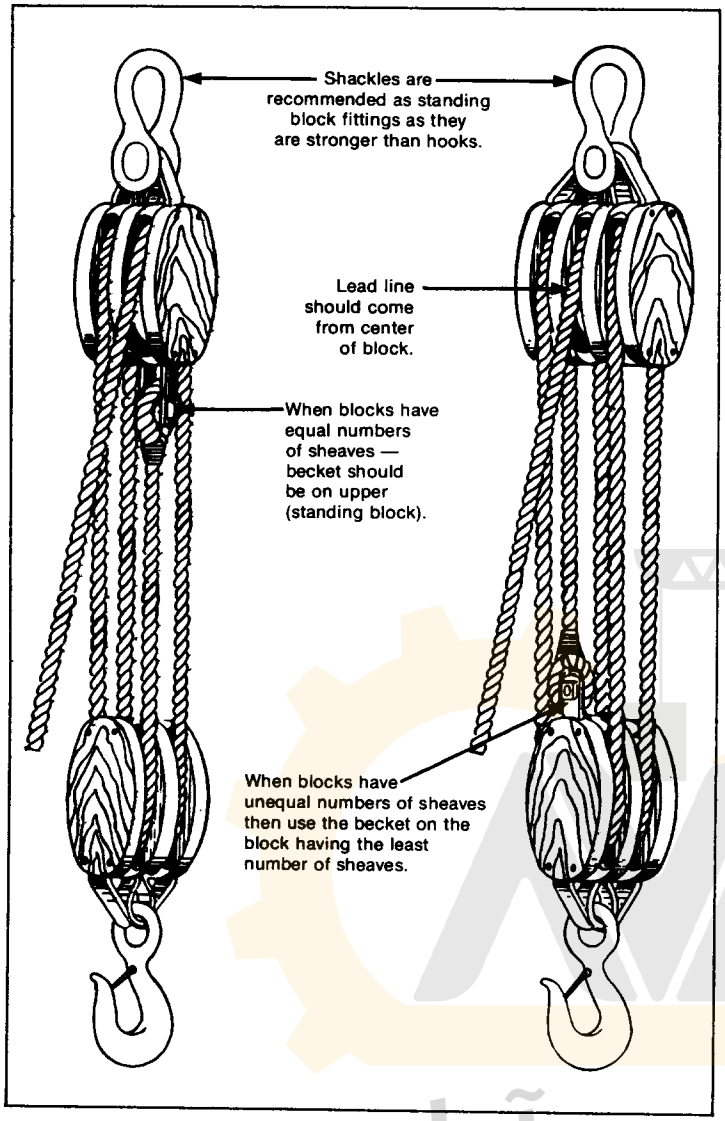
6-Part Line



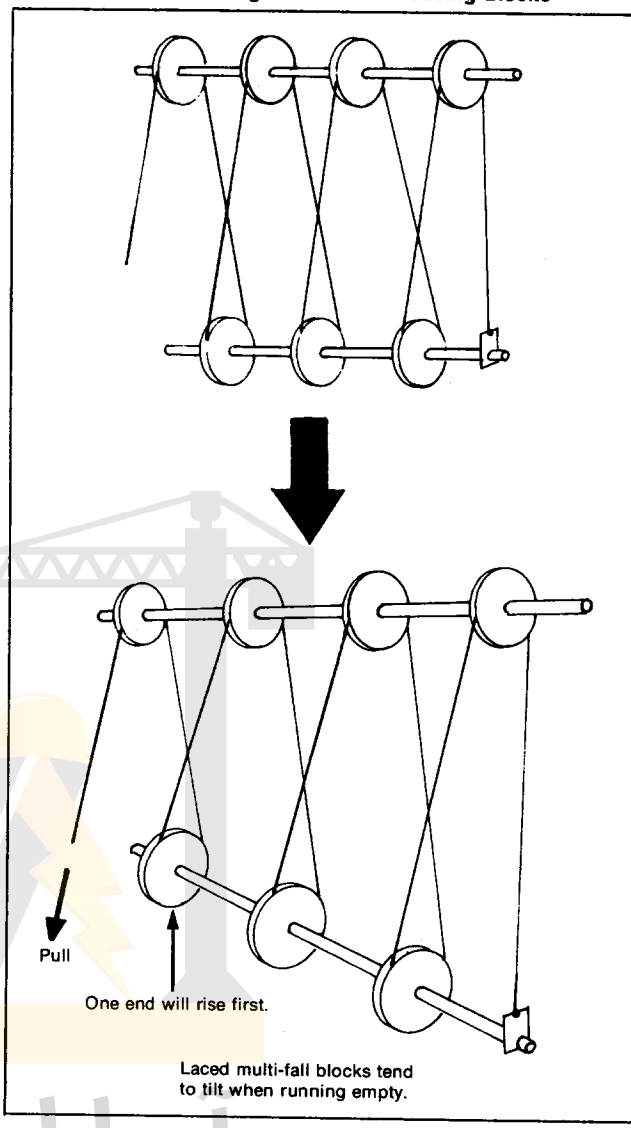
7-Part Line



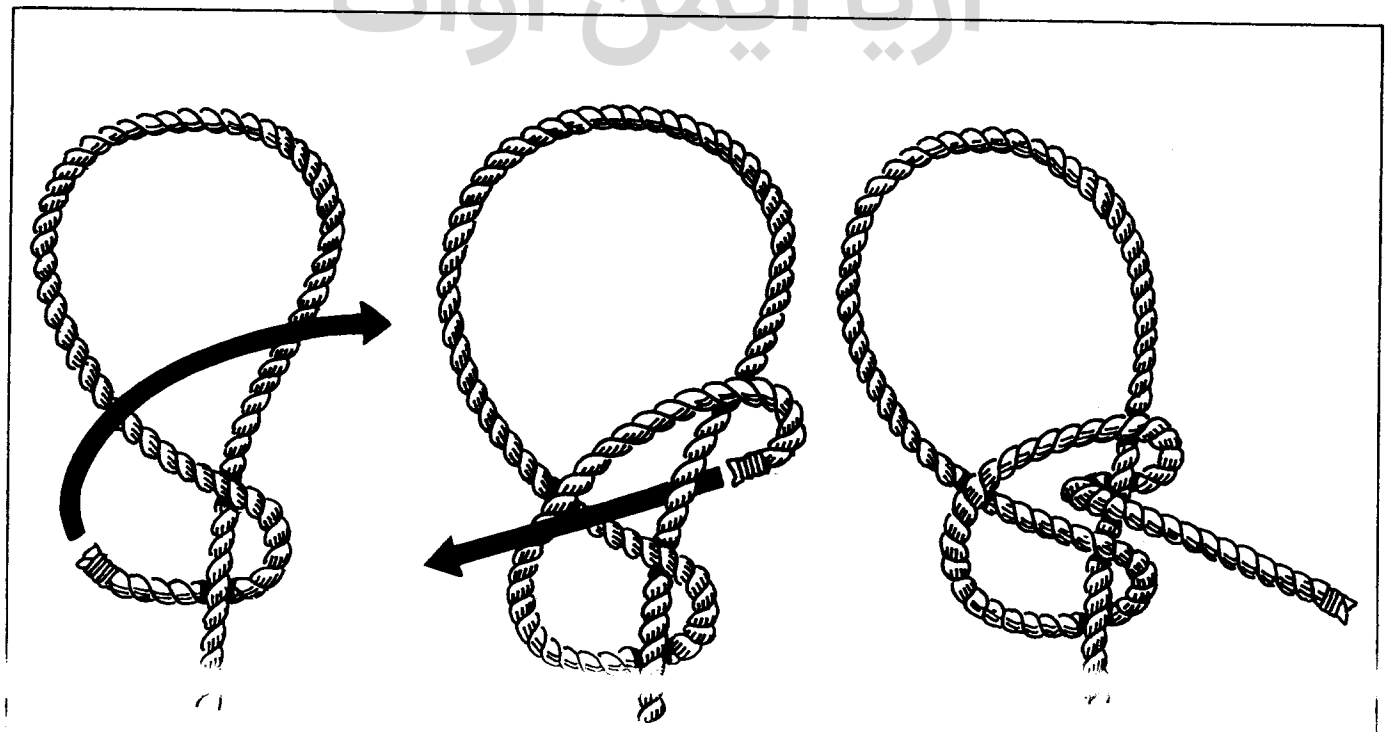
Block Orientation in a Reeved System



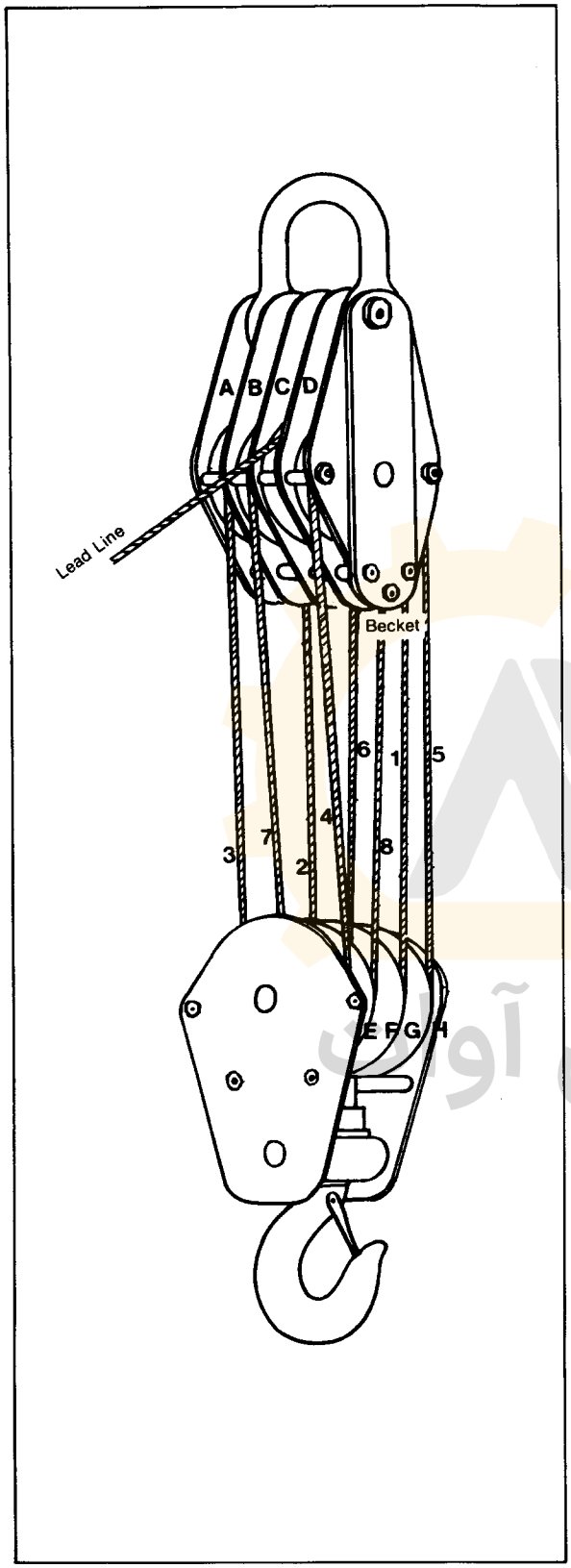
Effect of Lacing Rather than Reeving Blocks



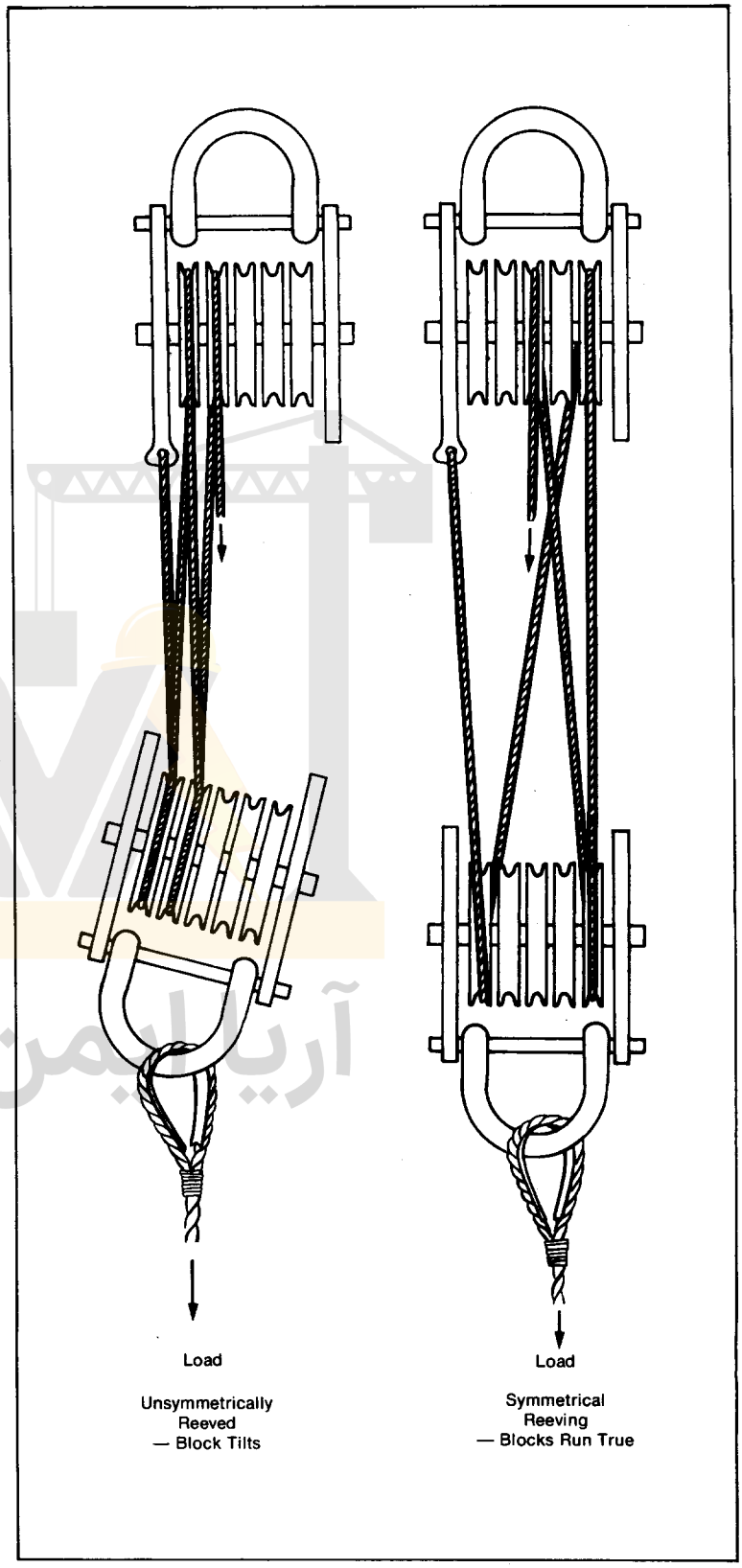
Becket Hitch



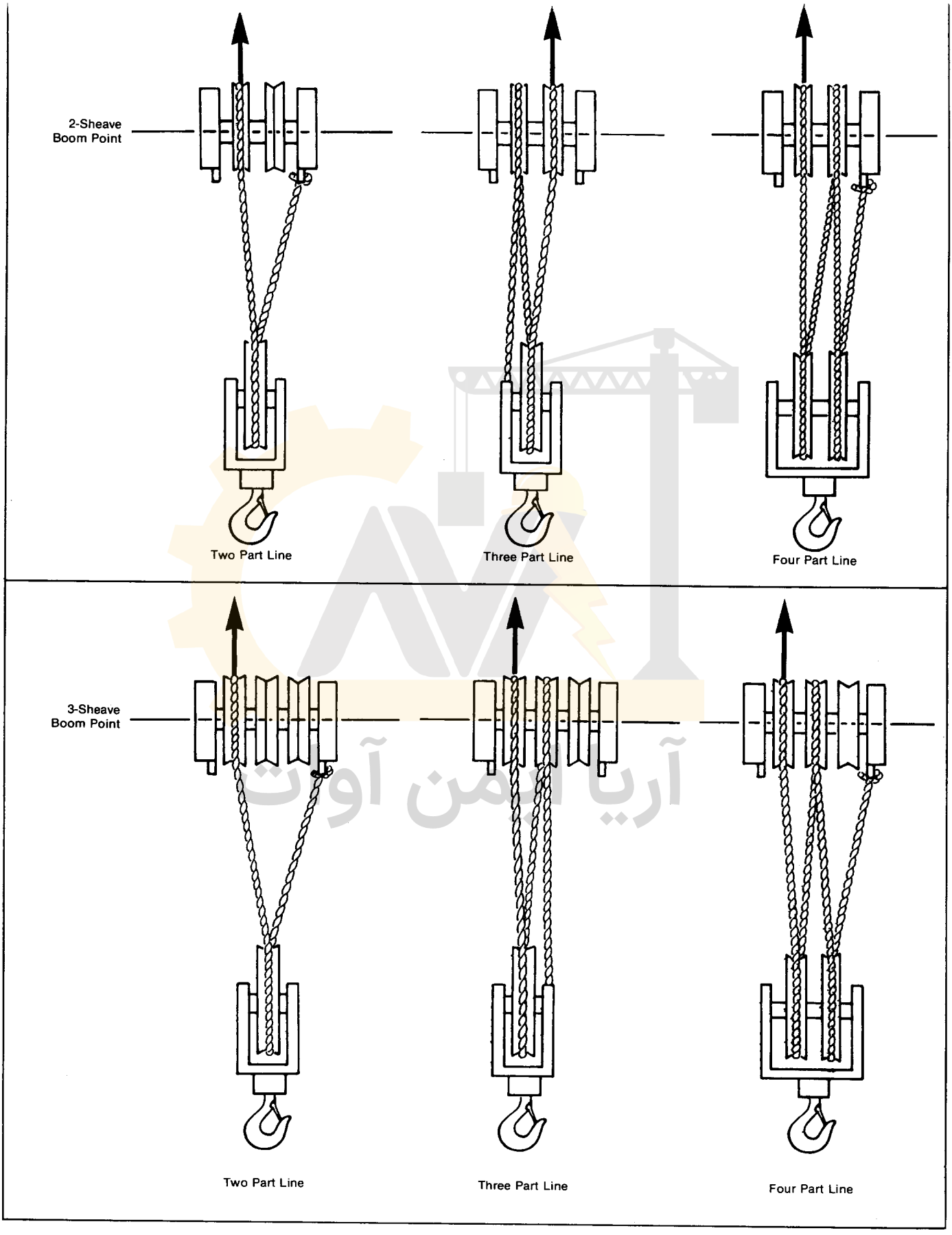
8-Part Falls



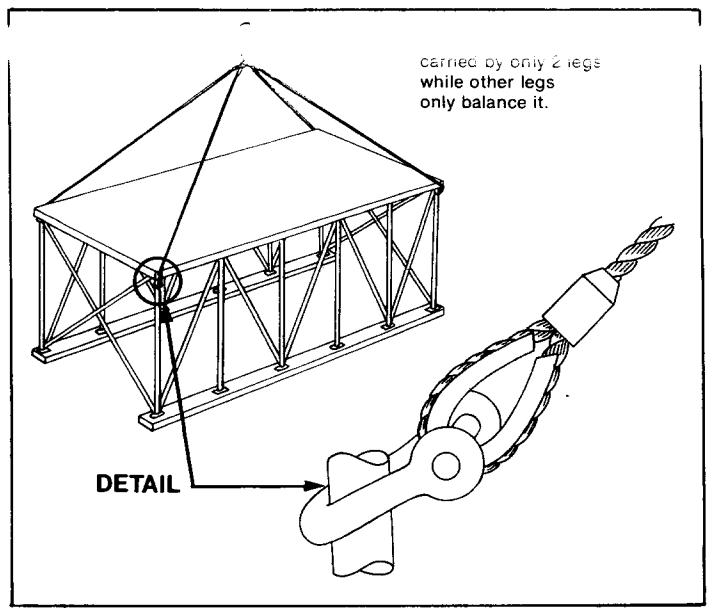
Symmetrical Reeving



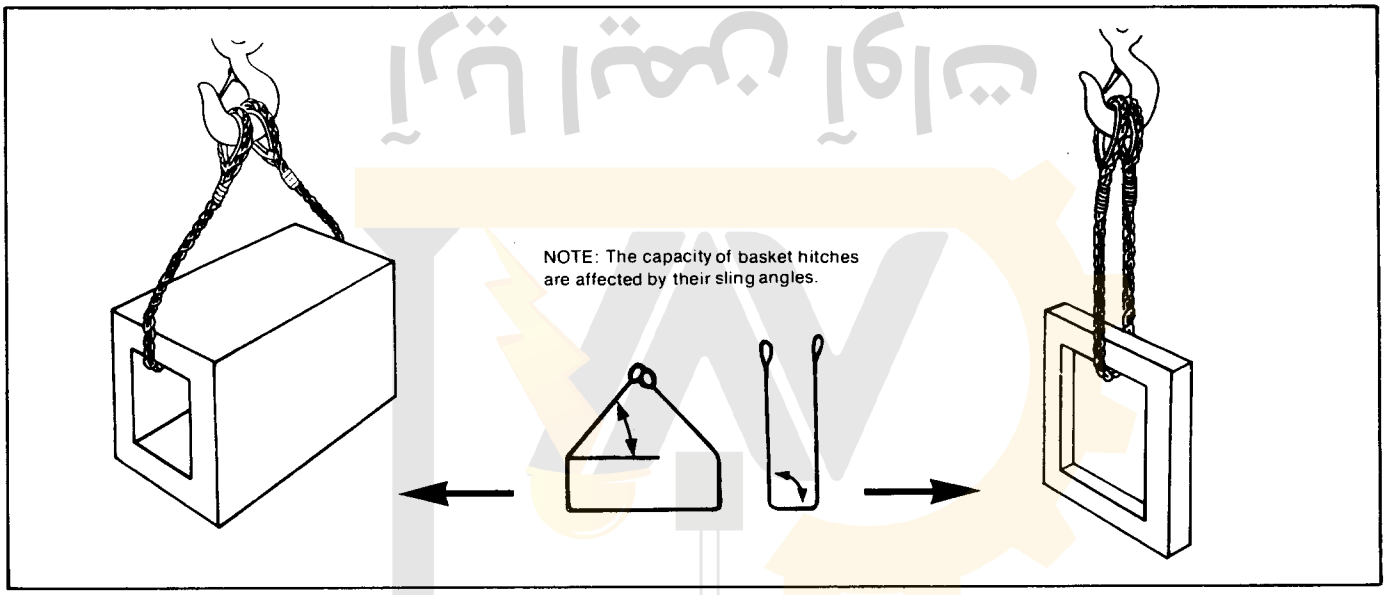
Symmetrical Boom Point Reeving



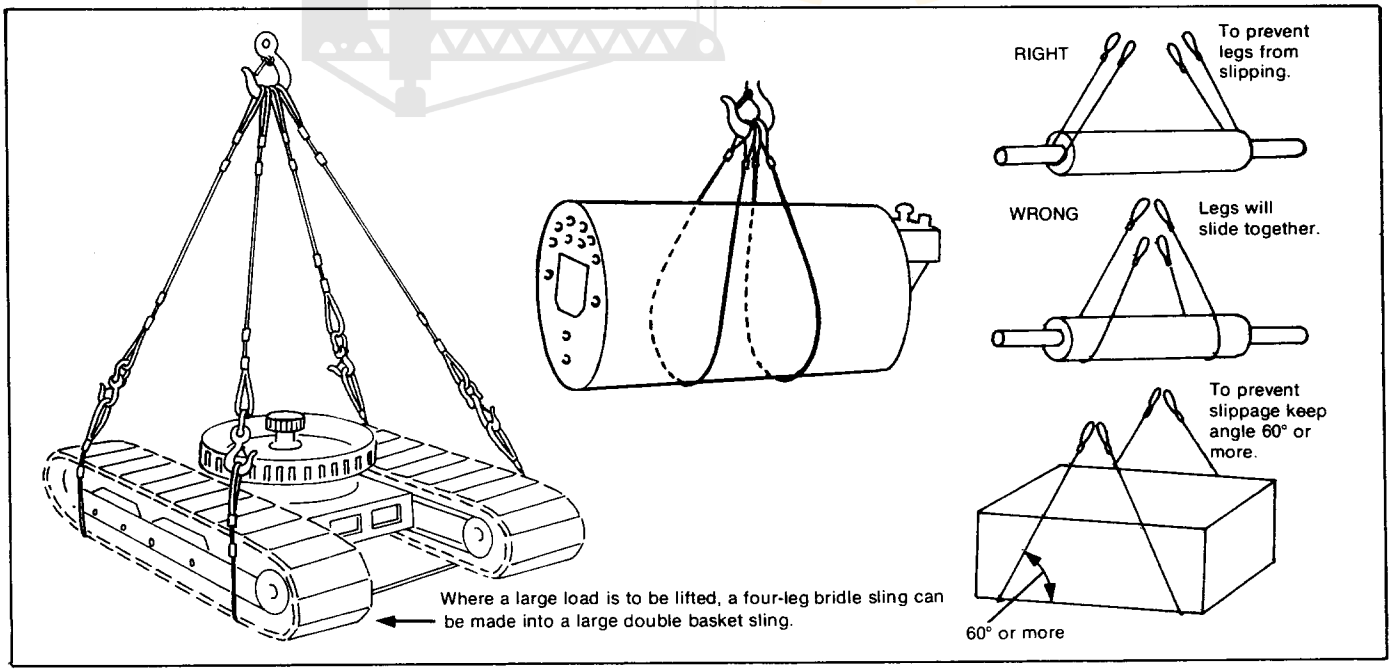
4-Leg Bridle Hitch



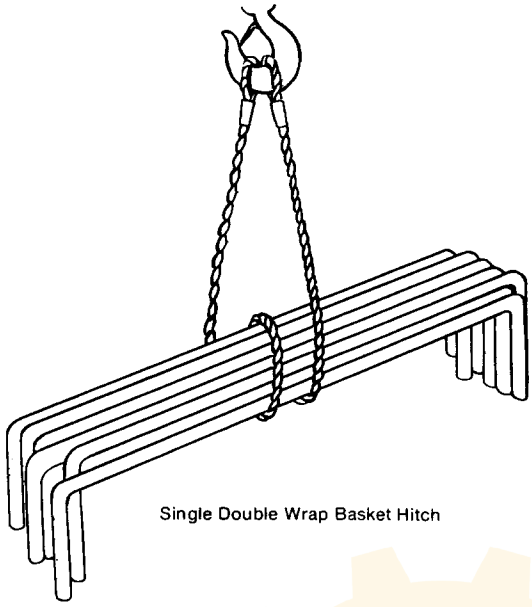
Single Basket Hitch



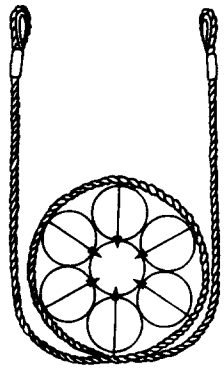
Double Basket Hitches



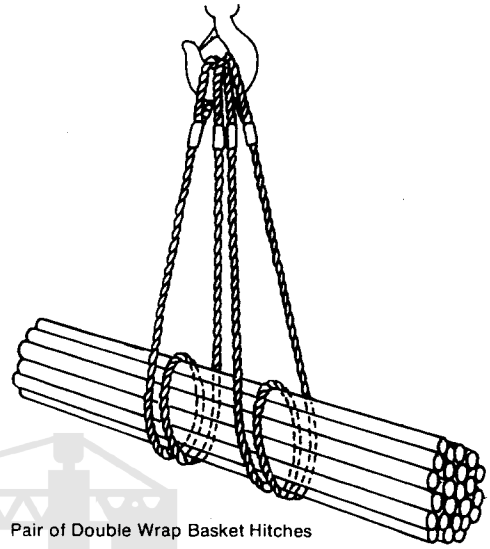
Double Wrap Basket Hitch



Single Double Wrap Basket Hitch

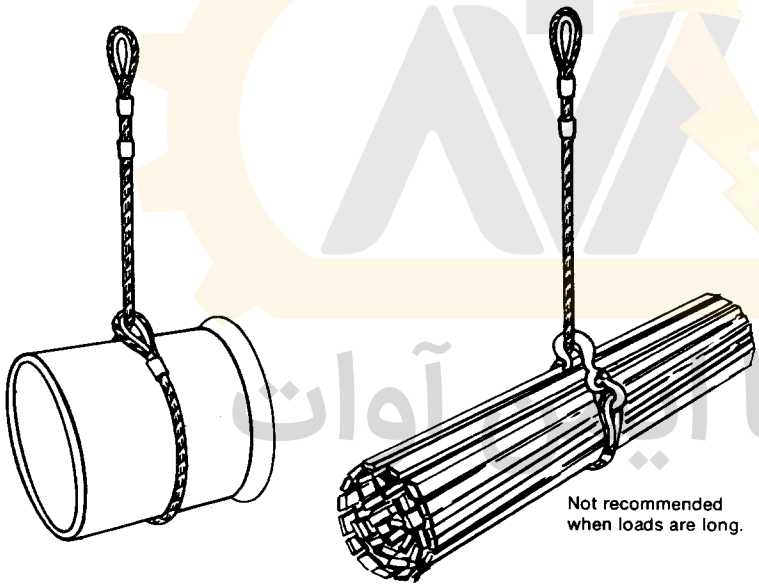


This hitch compresses the load and prevents it from slipping out of the slings.



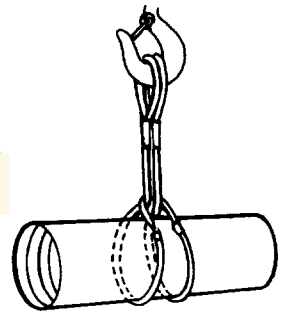
Pair of Double Wrap Basket Hitches

Single Choker Hitches



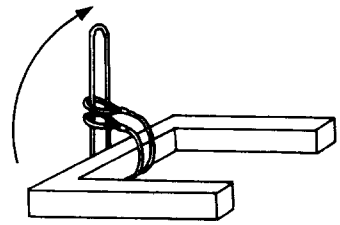
Not recommended when loads are long.

NOTE: Choker hitches are not suited to long loose bundles.

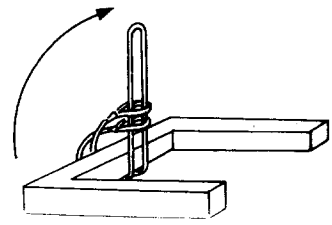


"Doubled" Choker

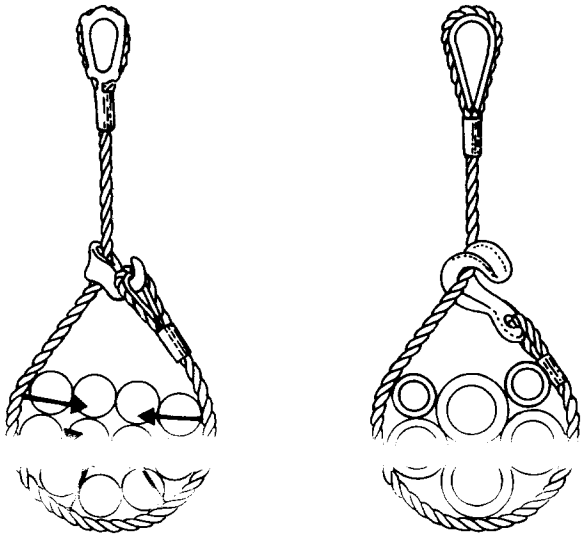
Use a "Doubled" Choker to turn loads



RIGHT

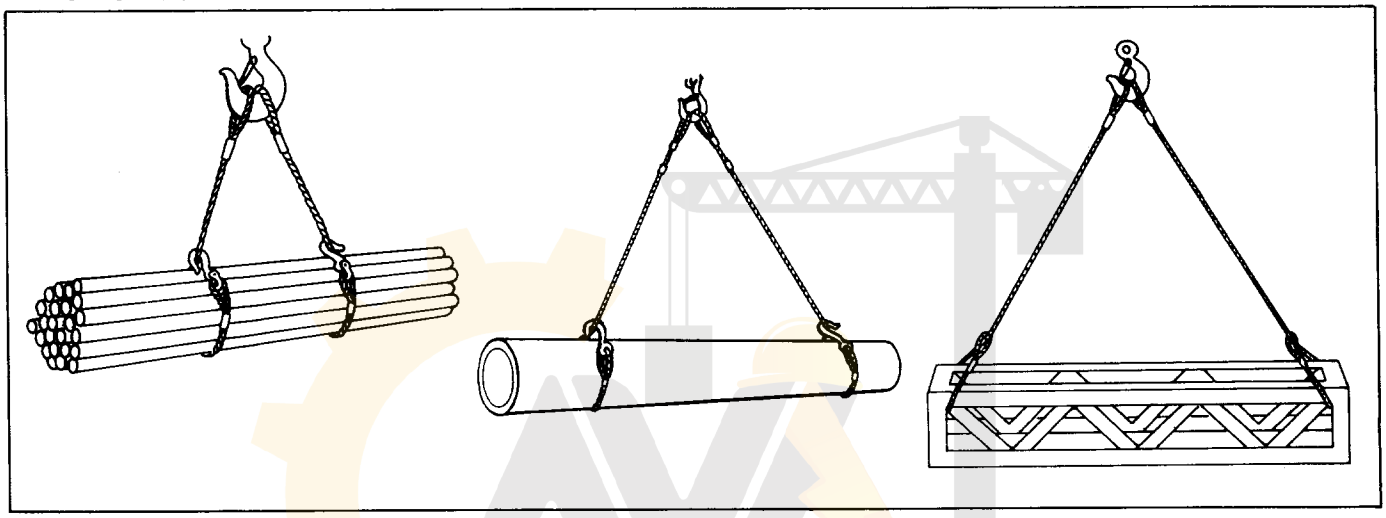


WRONG

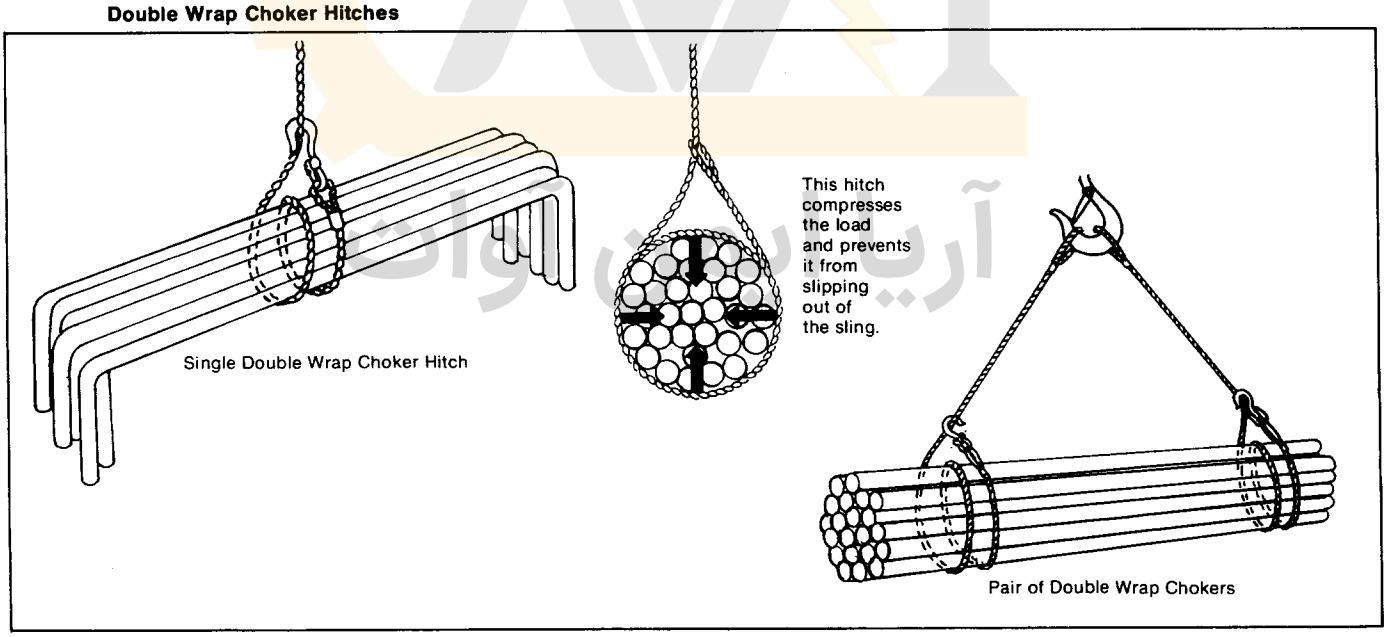


Chokers do not provide full support for loose loads — material can fall out.

Double Choker Hitches

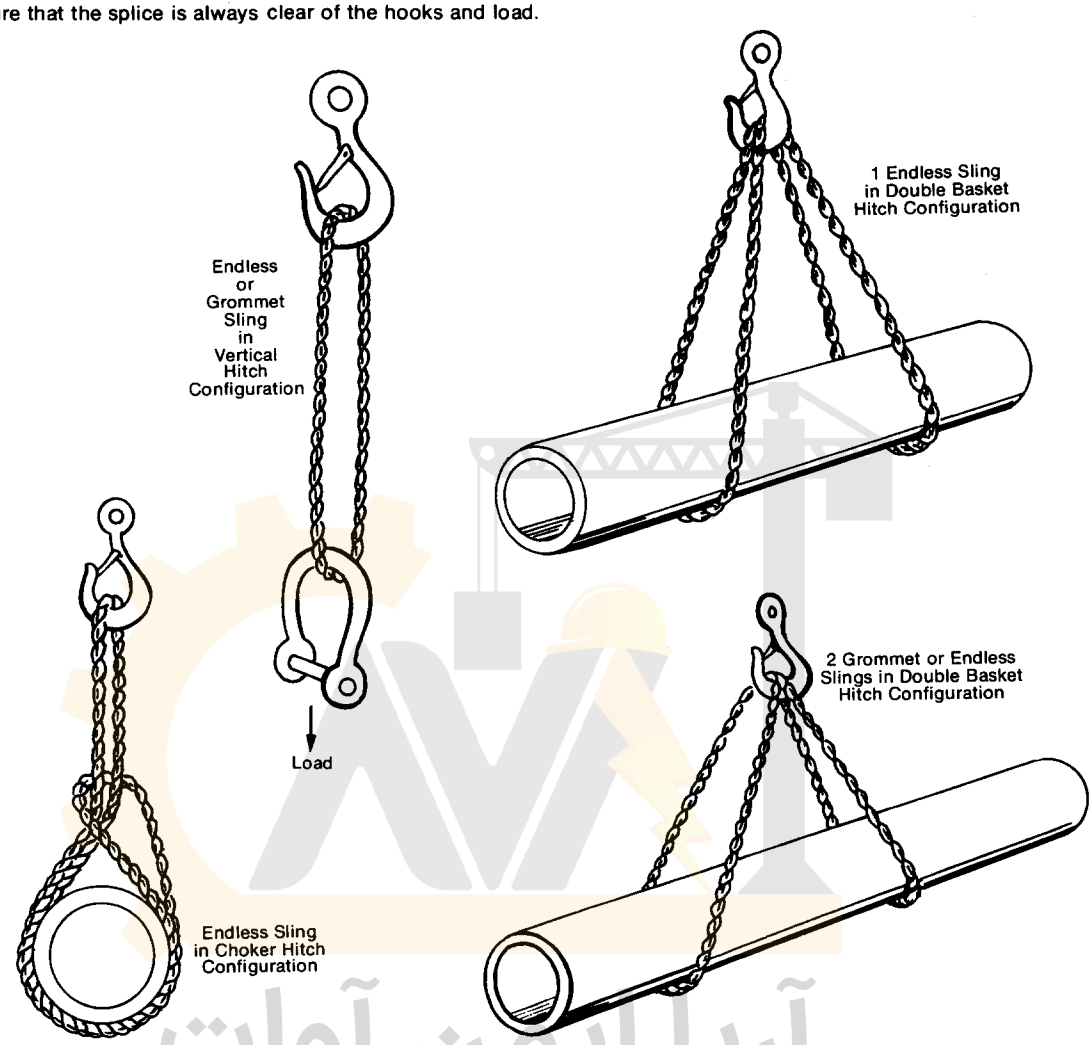


Double Wrap Choker Hitches

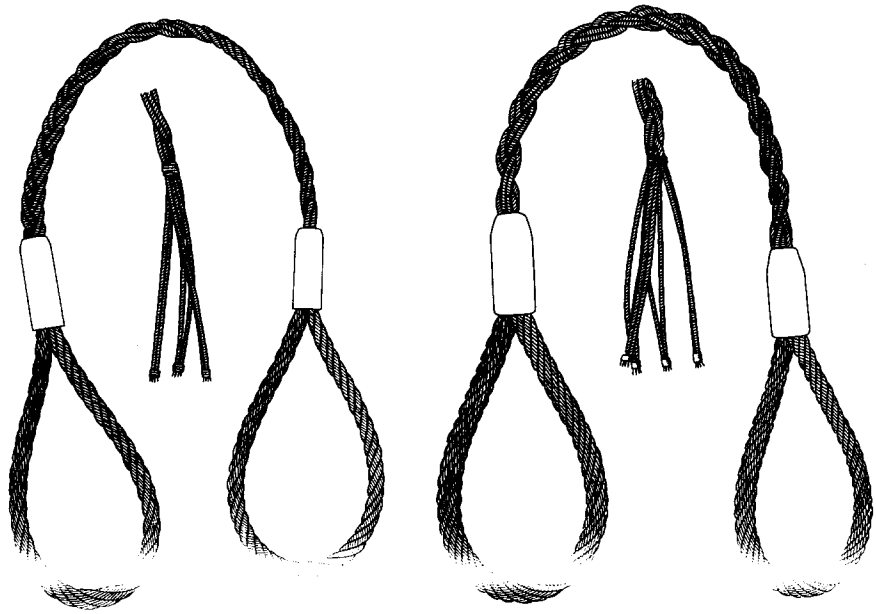


Endless Slings or Grommet Slings

NOTE: Ensure that the splice is always clear of the hooks and load.



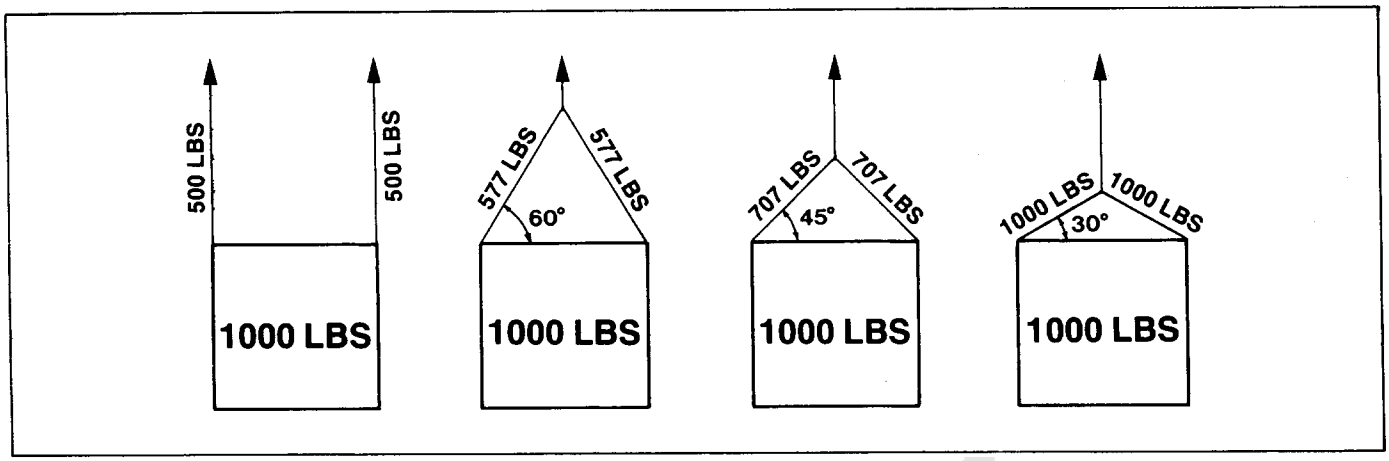
Braided Slings



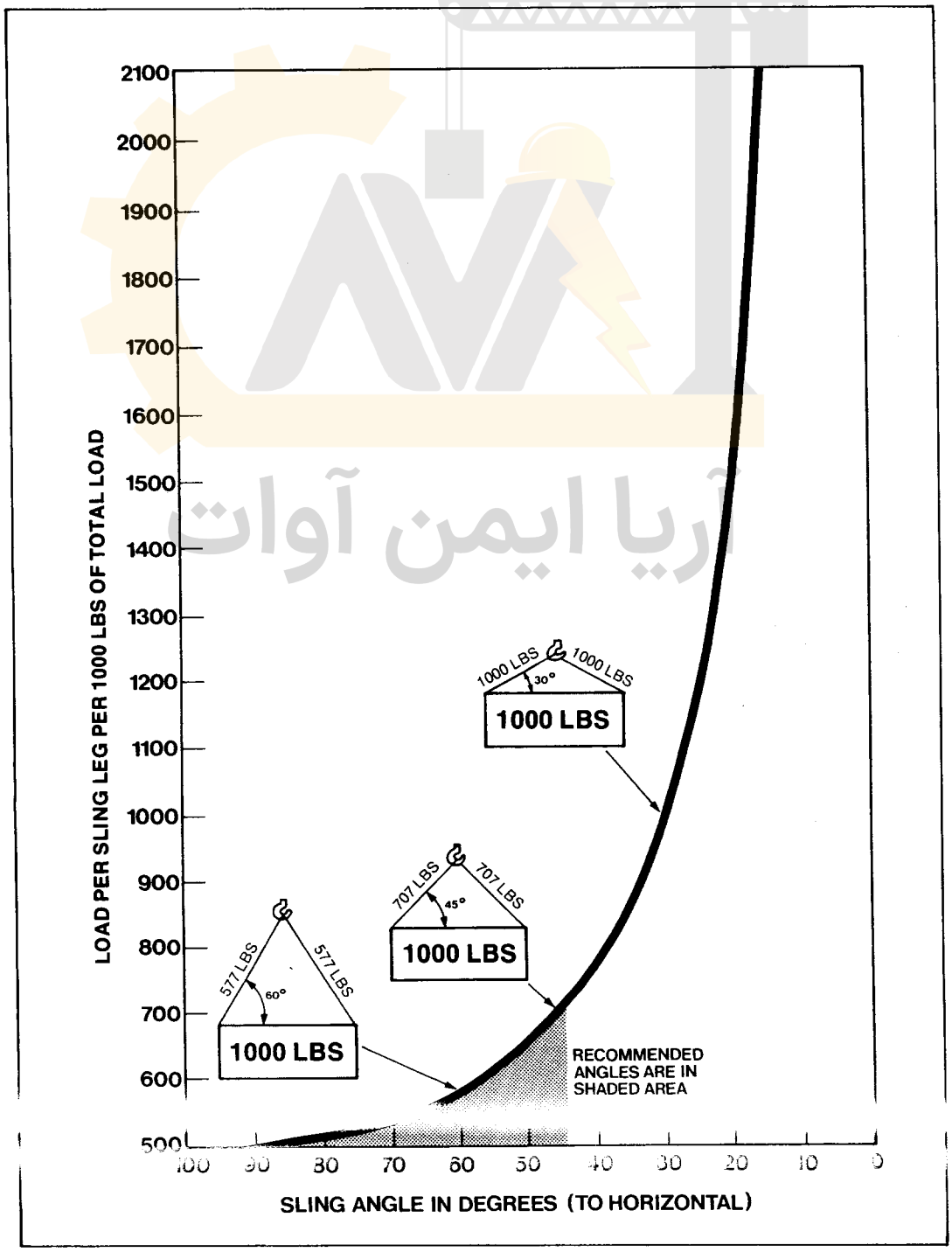
8-Part Braided Sling

8-Part Braided Sling

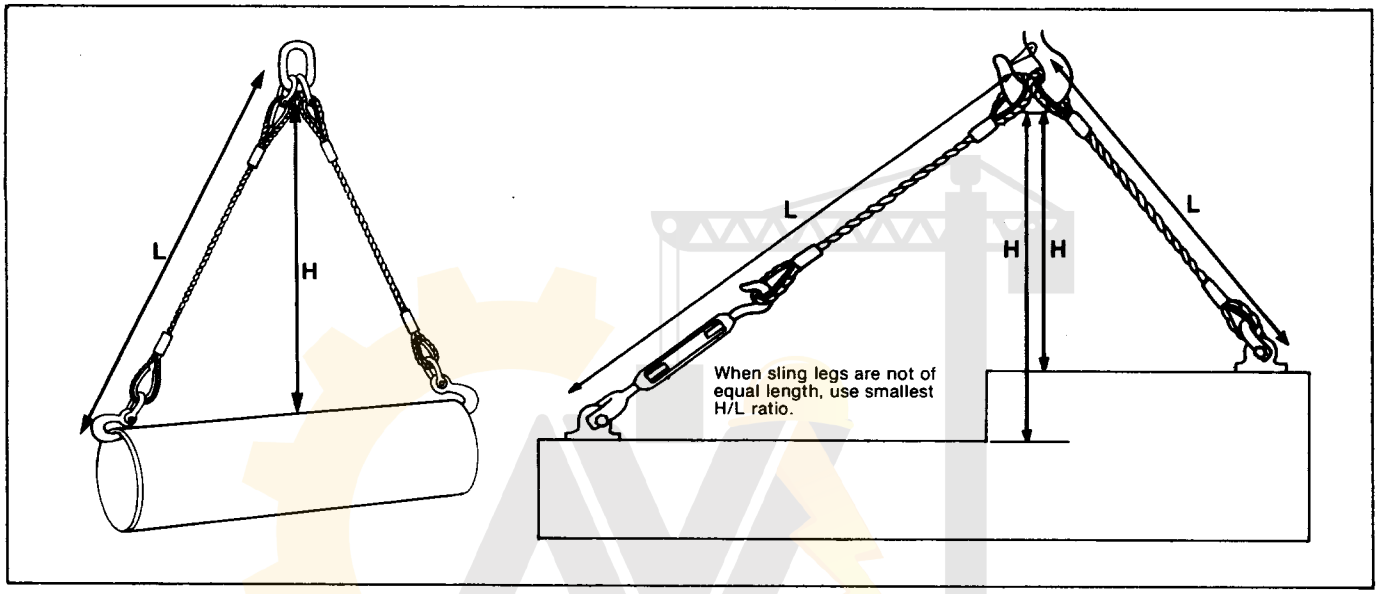
Effect of Sling Angle on Sling Load



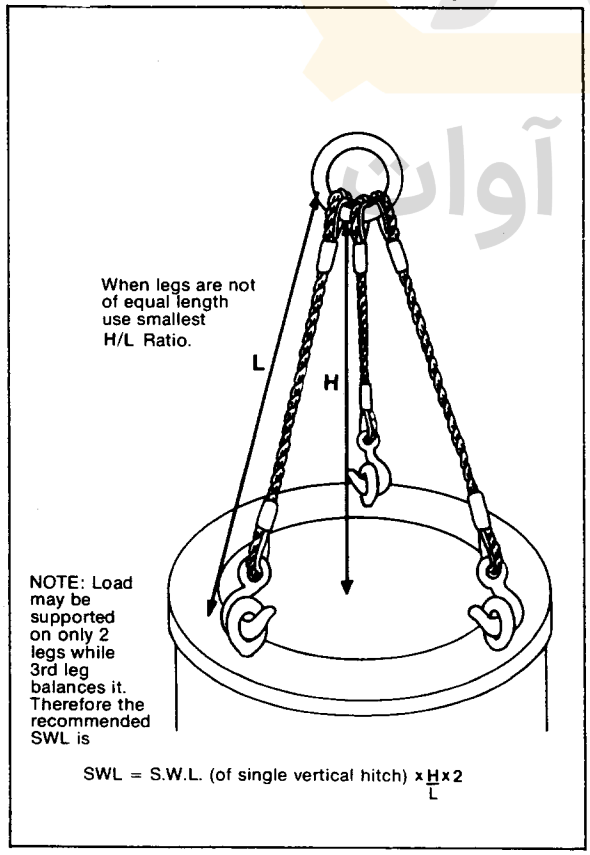
Effect of Sling Angle on Sling Load



Determination of Capacity of 2-Leg Bridle Hitches

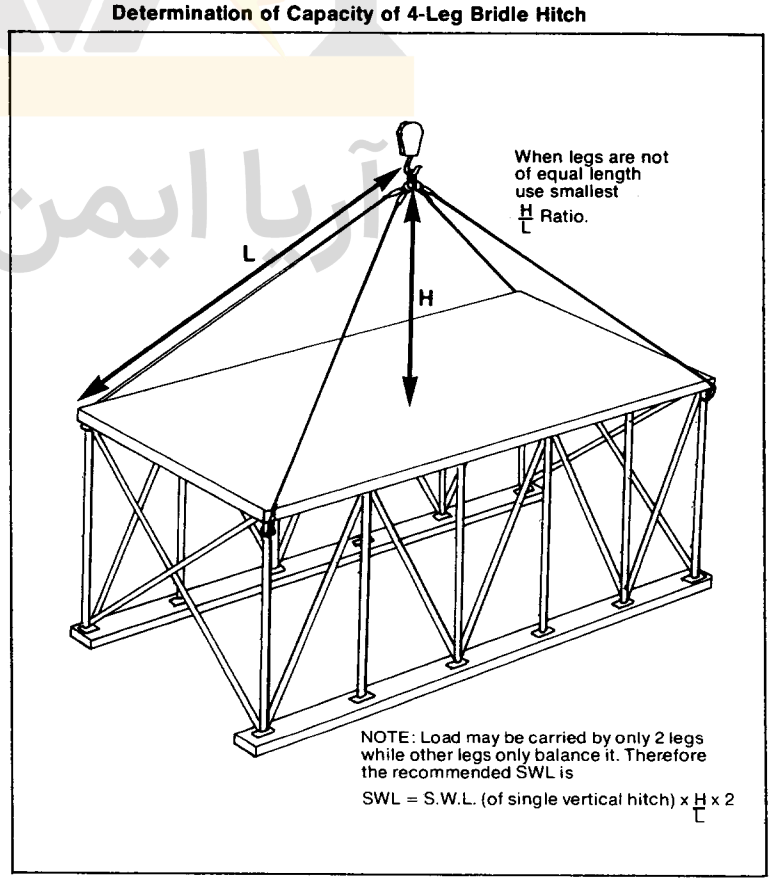


Determination of Capacity of 3-Leg Bridle Hitch



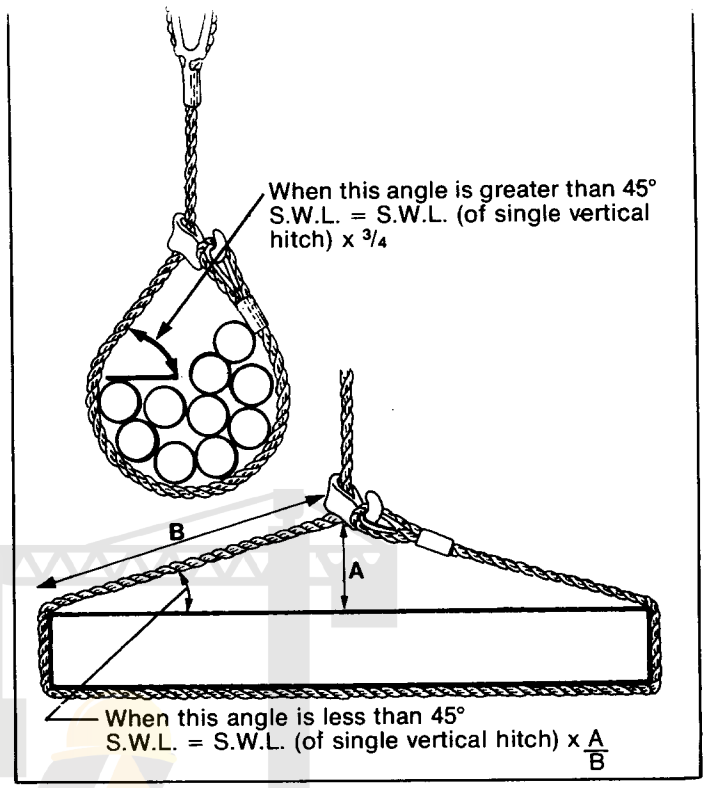
SWL = S.W.L. (of single vertical hitch) $\times \frac{H}{L} \times 2$

Determination of Capacity of 4-Leg Bridle Hitch

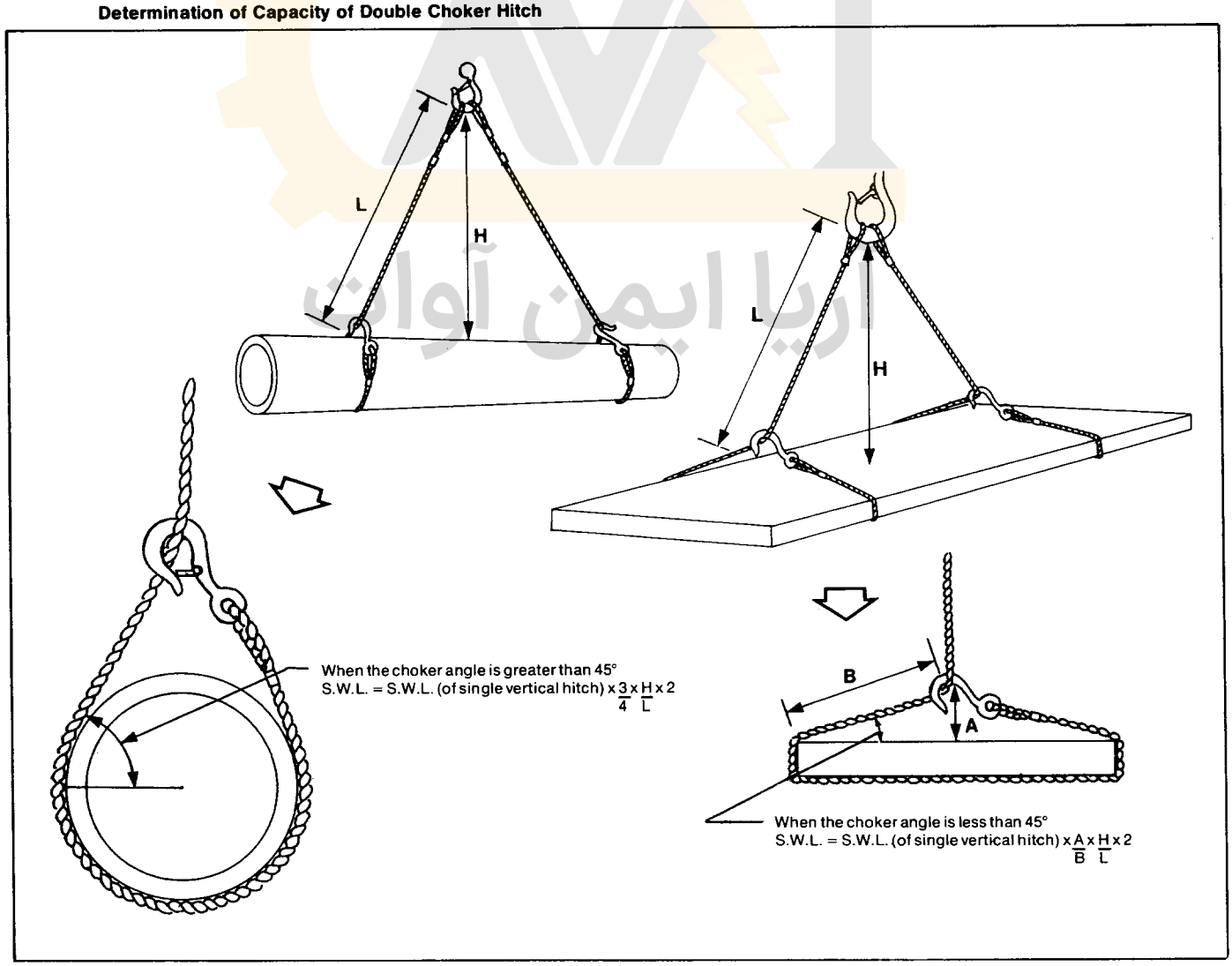


SWL = S.W.L. (of single vertical hitch) $\times \frac{H}{L} \times 2$

Determination of Capacity of Single Choker Hitch



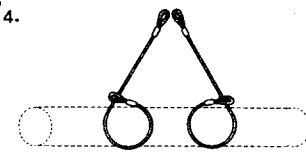
Determination of Capacity of Double Choker Hitch



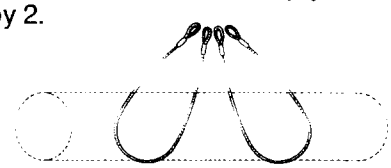
MANILA ROPE SLINGS
Spliced Eyes in Both Ends

Rope Diameter (Inches)	MAXIMUM SAFE WORKING LOADS — POUNDS (Safety Factor = 5)					
	Single Vertical Hitch	Single Choker Hitch	Single Basket Hitch (Vertical Legs)	2-Leg Bridle Hitch & Single Basket Hitch With Legs Inclined		
				60°	45°	30°
3/16	100	75	200	170	140	100
1/4	120	90	240	210	170	120
5/16	200	150	400	350	280	200
3/8	270	200	540	470	380	270
1/2	530	400	1,060	920	750	530
9/16	680	500	1,360	1,180	960	680
5/8	880	660	1,760	1,520	1,240	880
3/4	1,080	800	2,160	1,870	1,530	1,080
13/16	1,300	980	2,600	2,250	1,840	1,300
7/8	1,540	1,150	3,080	2,670	2,180	1,540
1	1,800	1,350	3,600	3,100	2,550	1,800
1 1/16	2,100	1,580	4,200	3,600	2,970	2,100
1 1/8	2,400	1,800	4,800	4,150	3,400	2,400
1 1/4	2,700	2,000	5,400	4,670	3,800	2,700
1 5/16	3,000	2,250	6,000	5,200	4,200	3,000
1 1/2	3,700	2,800	7,400	6,400	5,250	3,700
1 5/8	4,500	3,400	9,000	7,800	6,350	4,500
1 3/4	5,300	4,000	10,600	9,200	7,500	5,300
2	6,200	4,650	12,400	10,700	8,800	6,200
2 1/8	7,200	5,400	14,400	12,500	10,200	7,200
2 1/4	8,200	6,150	16,400	14,200	11,600	8,200
2 1/2	9,300	7,000	18,600	16,100	13,200	9,300
2 5/8	10,400	7,800	20,800	18,000	14,700	10,400

If used with Choker Hitch multiply above values by 3/4.



For Double Basket Hitch multiply above values by 2.

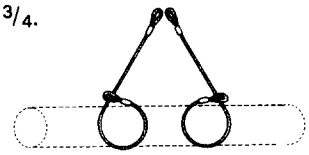


Note: For Safe Working Loads of Endless or Grommet Slings, Multiply Above Values by 2.

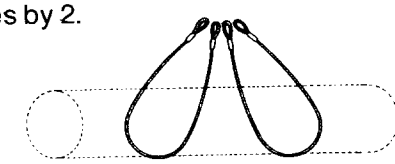
NYLON ROPE SLINGS
Spliced Eyes in Both Ends

Rope Diameter (Inches)	MAXIMUM SAFE WORKING LOADS — POUNDS (Safety Factor = 5)					
	Single Vertical Hitch	Single Choker Hitch	Single Basket Hitch (Vertical Legs)	2-Leg Bridle Hitch & Single Basket Hitch With Legs Inclined		
				60°	45°	30°
3/16	200	150	400	350	280	200
1/4	300	225	600	520	420	300
5/16	500	375	1,000	870	700	500
3/8	700	525	1,400	1,200	1,000	700
1/2	1,250	940	2,500	2,200	1,770	1,250
9/16	1,500	1,125	3,000	2,600	2,100	1,500
5/8	2,000	1,500	4,000	3,500	2,800	2,000
3/4	2,800	2,100	5,600	4,850	4,000	2,800
13/16	3,200	2,400	6,600	5,500	4,500	3,200
7/8	3,800	2,850	7,600	6,600	5,400	3,800
1	4,800	3,600	9,600	8,300	6,800	4,800
1 1/16	5,500	4,125	11,000	9,500	7,800	5,500
1 1/8	6,300	4,725	12,600	10,900	8,900	6,300
1 1/4	7,200	5,400	14,400	12,500	10,200	7,200
1 5/16	8,200	6,150	16,400	14,200	11,600	8,200
1 1/2	10,200	7,650	20,400	17,700	14,400	10,200
1 5/8	12,400	9,300	24,800	21,500	17,500	12,400
1 3/4	15,000	11,250	30,000	26,000	21,200	15,000
2	17,900	13,400	35,800	31,000	25,300	17,900
2 1/8	20,200	15,150	40,400	35,000	28,600	20,200
2 1/4	23,800	17,850	47,600	41,200	33,700	23,800
2 1/2	26,600	20,000	53,200	46,100	37,600	26,600
2 5/8	30,700	23,000	61,400	53,200	43,400	30,700

If used with Choker Hitch multiply above values by 3/4.



For Double Basket Hitch multiply above values by 2.

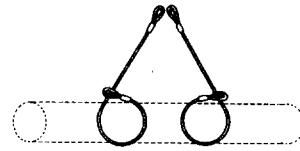


Note: For Safe Working Loads of Endless or Grommet Slings, Multiply Above Values by 2.

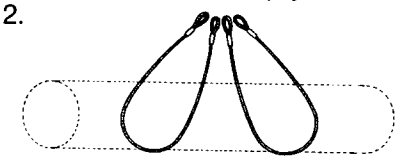
POLYPROPYLENE ROPE SLINGS
Spliced Eyes in Both Ends

Rope Diameter (Inches)	MAXIMUM SAFE WORKING LOADS — POUNDS (Safety Factor = 5)					
	Single Vertical Hitch	Single Choker Hitch	Single Basket Hitch (Vertical Legs)	2-Leg Bridle Hitch & Single Basket Hitch With Legs Inclined		
				60°	45°	30°
3/16	150	110	300	260	210	150
1/4	250	190	500	430	350	250
5/16	400	300	800	700	560	400
3/8	500	375	1,000	860	700	500
1/2	830	620	1,660	1,400	1,200	830
9/16	960	720	1,920	1,700	1,350	960
5/8	1,300	975	2,600	2,250	1,800	1,300
3/4	1,700	1,275	3,400	2,900	2,400	1,700
13/16	1,900	1,425	3,800	3,300	2,700	1,900
7/8	2,200	1,650	4,400	3,800	3,100	2,200
1	2,900	2,175	5,800	5,000	4,100	2,900
1 1/16	3,000	2,250	6,000	5,200	4,200	3,000
1 1/8	3,750	2,800	7,500	6,500	5,300	3,750
1 1/4	4,200	3,150	8,400	7,300	5,900	4,200
1 5/16	4,400	3,300	8,800	7,600	6,200	4,400
1 1/2	6,000	4,500	12,000	10,400	8,500	6,000
1 5/8	7,300	5,500	14,600	12,600	10,300	7,300
1 3/4	8,700	6,500	17,400	15,100	12,300	8,700
2	10,400	7,800	20,800	18,000	14,700	10,400
2 1/8	11,500	8,600	23,000	19,900	16,300	11,500
2 1/4	13,200	9,900	26,400	22,900	18,700	13,200
2 1/2	15,100	11,300	30,200	26,200	21,400	15,100
2 5/8	17,000	12,750	34,000	29,400	24,000	17,000

If used with Choker Hitch multiply above values by 3/4.



For Double Basket Hitch multiply above values by 2.

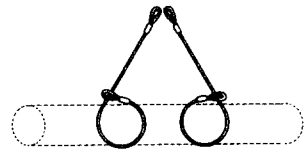


Note: For Safe Working Loads of Endless or Grommet Slings, Multiply Above Values by 2

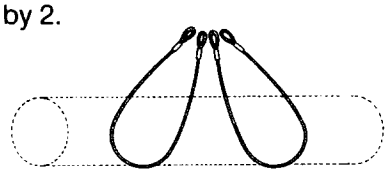
POLYESTER ROPE SLINGS
Spliced Eyes in Both Ends

Rope Diameter (Inches)	MAXIMUM SAFE WORKING LOADS — POUNDS (Safety Factor = 5)					
	Single Vertical Hitch	Single Choker Hitch	Single Basket Hitch (Vertical Legs)	2-Leg Bridle Hitch & Single Basket Hitch With Legs Inclined		
				60°	45°	30°
3/16	200	150	400	350	280	200
1/4	300	225	600	520	420	300
5/16	500	375	1,000	870	700	500
3/8	700	525	1,400	1,200	1,000	700
1/2	1,200	900	2,400	2,100	1,700	1,200
9/16	1,500	1,125	3,000	2,600	2,100	1,500
5/8	1,900	1,425	3,800	3,300	2,700	1,900
3/4	2,400	1,800	4,800	4,150	3,400	2,400
13/16	2,950	2,200	5,900	5,100	4,200	2,950
7/8	3,400	2,550	6,800	5,900	4,800	3,400
1	4,200	3,150	8,400	7,300	5,900	4,200
1 1/16	4,900	3,675	9,800	8,500	6,900	4,900
1 1/8	5,600	4,200	11,200	9,700	7,900	5,600
1 1/4	6,300	4,725	12,600	10,900	8,900	6,300
1 5/16	7,100	5,325	14,200	12,300	10,000	7,100
1 1/2	8,900	6,675	17,800	15,400	12,600	8,900
1 5/8	10,800	8,100	21,600	18,700	15,300	10,800
1 3/4	12,900	9,675	25,800	22,300	18,200	12,900
2	15,200	11,400	30,400	26,300	21,500	15,200
2 1/8	17,400	13,050	34,800	30,100	24,600	17,400
2 1/4	20,400	15,300	40,800	35,300	28,800	20,400
2 1/2	23,200	17,400	46,400	40,200	32,800	23,200
2 5/8	26,000	19,500	52,000	45,000	36,800	26,000

If used with Choker Hitch multiply above values by 3/4.

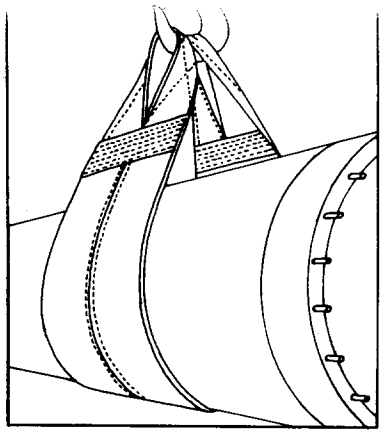


For Double Basket Hitch multiply above values by 2.

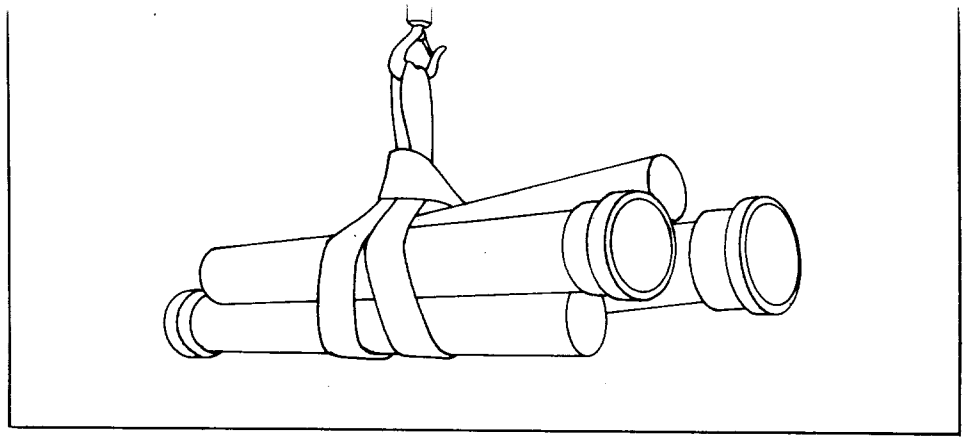


Note: For Safe Working Loads of Endless or Grommet Slings, Multiply Above Values by 2.

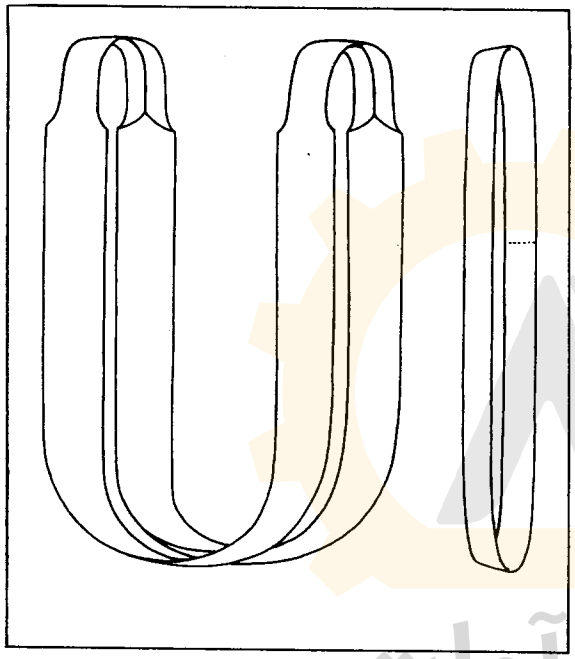
Synthetic Web Slings do not Damage or Crush Like Wire Ropes or Chain



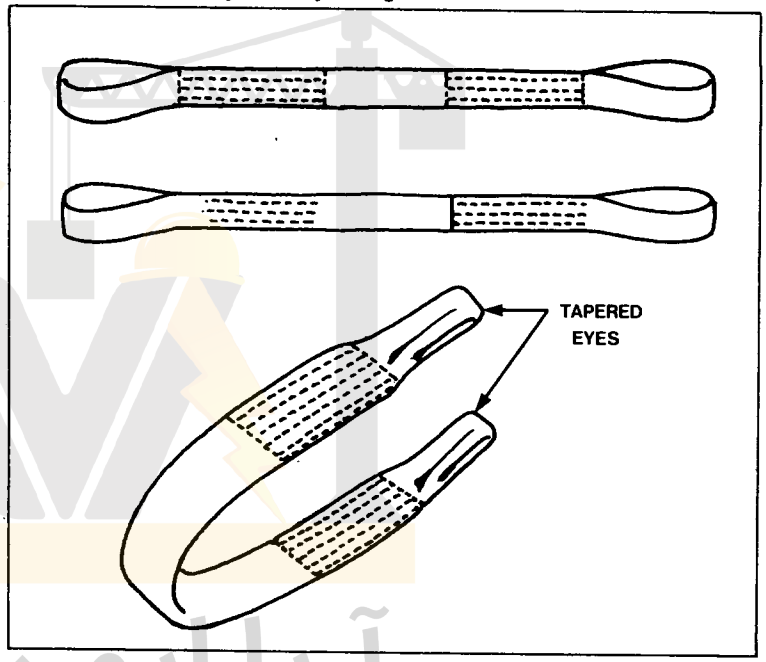
Pipe handling illustrates the tendency of webbing slings to mold themselves to the load. This allows handling irregularly shaped loads securely.



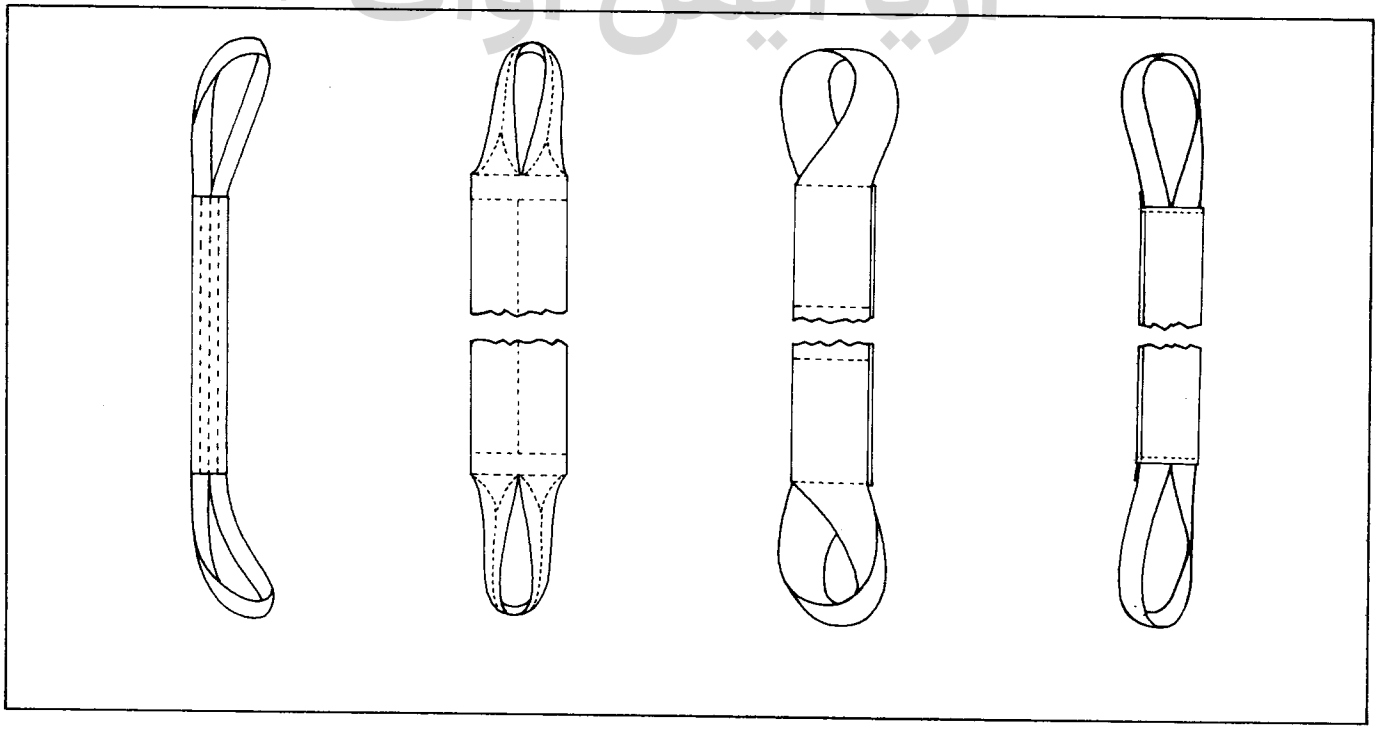
Endless or Grommet Sling



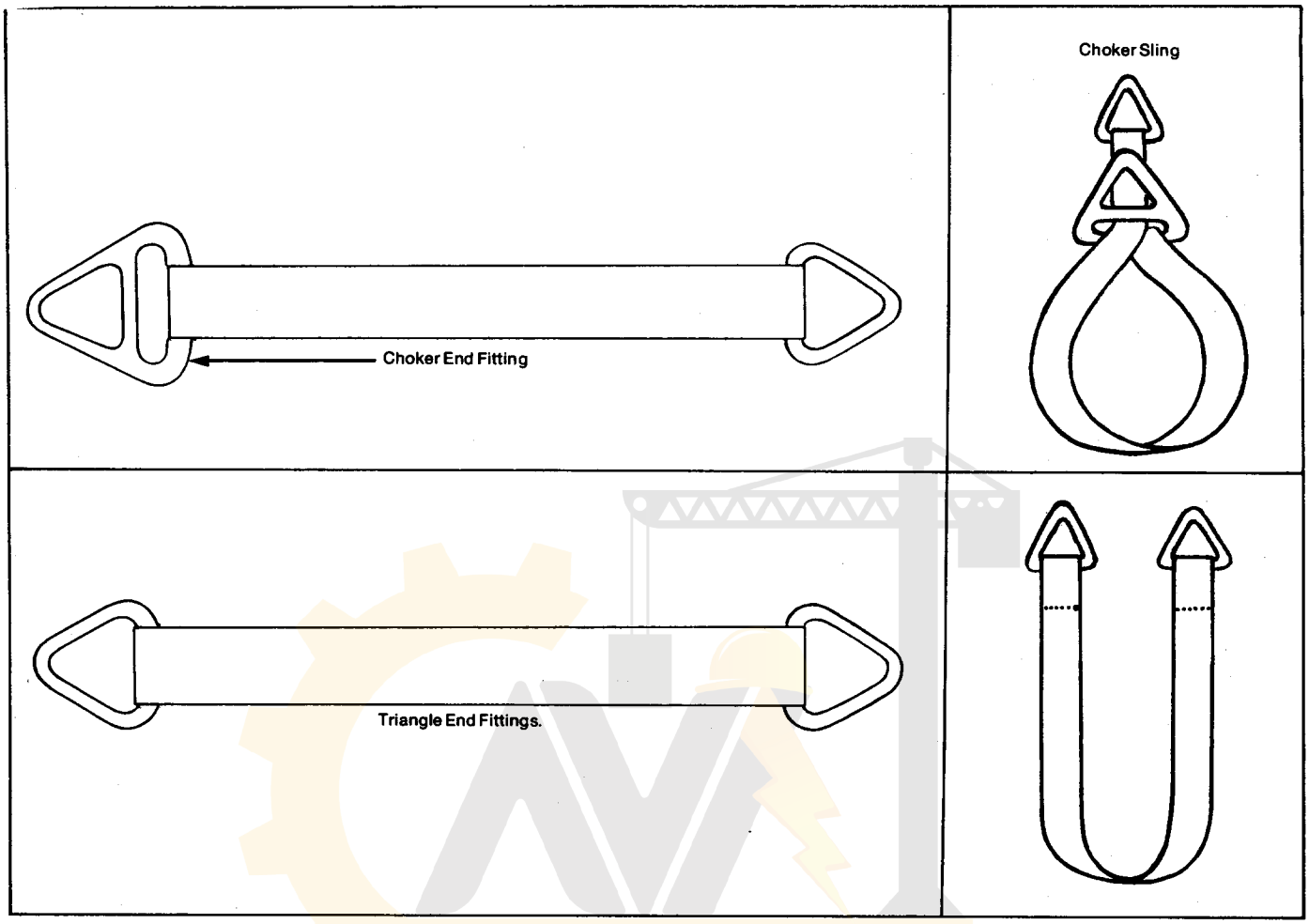
Standard Eye and Eye Slings



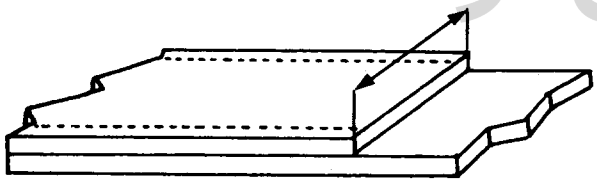
Twisted Eye Slings



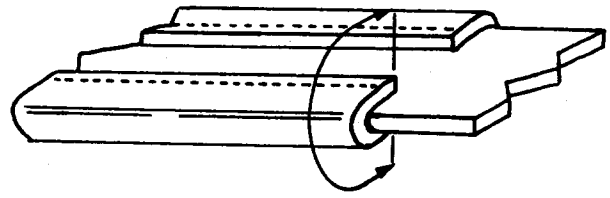
Metal End Fittings



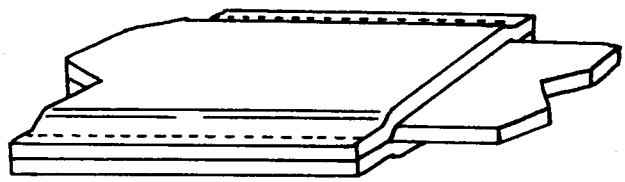
Web and Edge Protectors



REGULAR. This is the type that is sewn on to give fixed protection at expected wear points. They can be sewn anywhere on the sling, at any length on one side or on both sides.

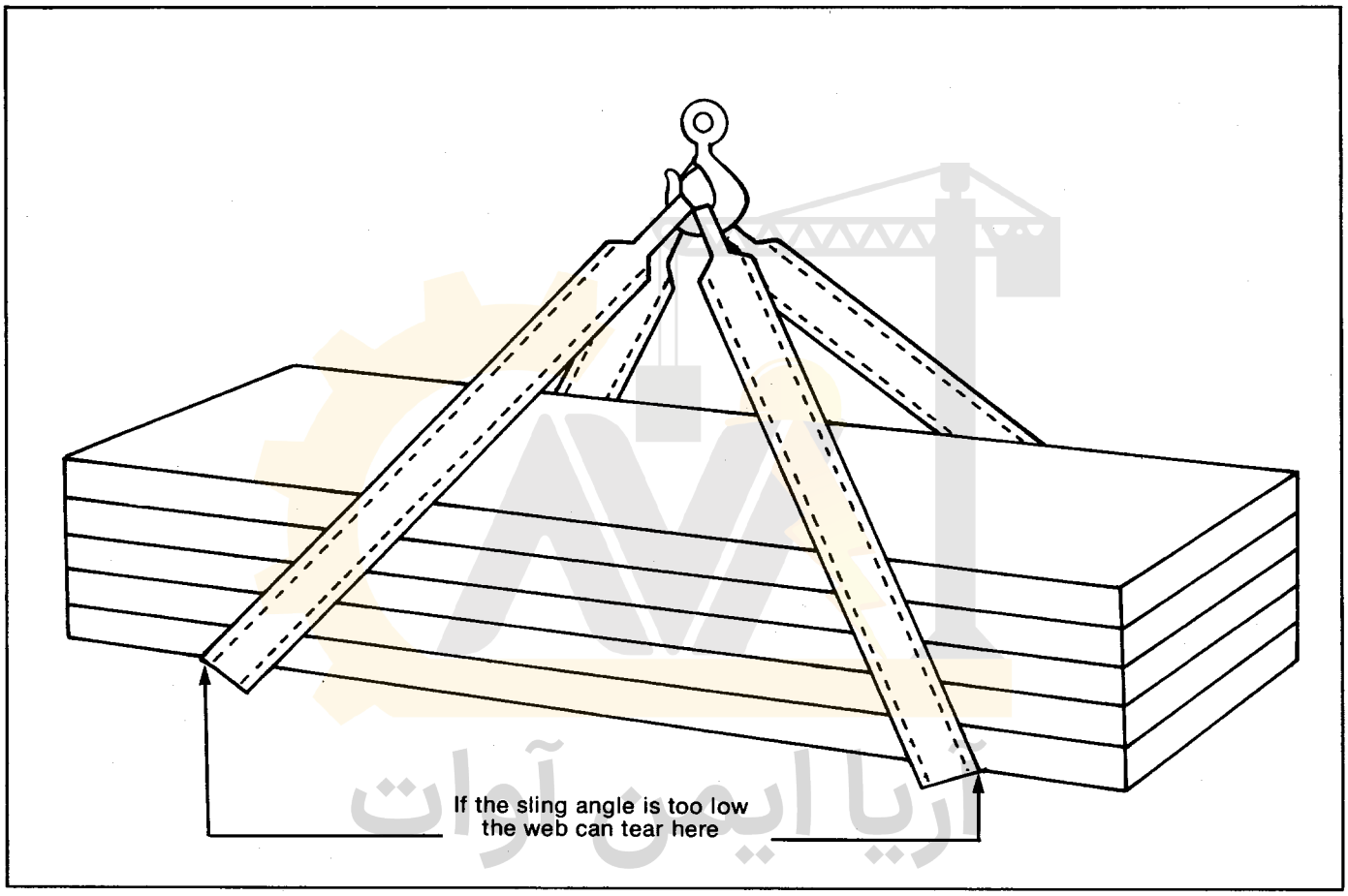


EDGEGUARD. A strip of webbing or leather is sewn around each edge of the sling. This is necessary for certain applications where the sling edges are subject to damage.



SLEEVE. Sometimes called sliding sleeve or tube type wear pads, these pads are ideal for handling material with sharp edges because the sleeve doesn't move when the sling stretches and adjusts to the load. Sleeves cover both sides of the sling and can be shifted to points of expected maximum wear.

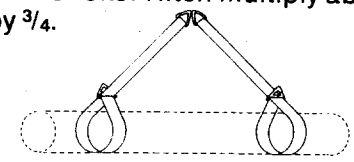
Effect of Low Sling Angle on Webbing



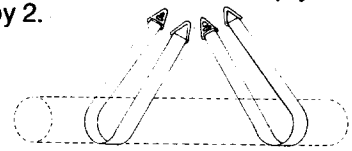
NYLON WEB SLINGS
(8000 lb/in Material)

Web Width (Inches)	MAXIMUM SAFE WORKING LOADS — POUNDS (SAFETY FACTOR = 5) (Eye & Eye, Twisted Eye, Triangle Fittings, Choker Fittings)					
	Single Vertical Hitch	Single Choker Hitch	Single Basket Hitch (Vertical Legs)	2-Leg Bridle Hitch & Single Basket Hitch With Legs Inclined		
				60°	45°	30°
1	1,600	1,200	3,200	2,770	2,260	1,600
2	3,200	2,400	6,400	5,550	4,520	3,200
3	4,800	3,600	9,600	8,300	6,800	4,800
4	6,400	4,800	12,800	11,100	9,050	6,400
5	8,000	6,000	16,000	13,850	11,300	8,000
6	9,600	7,200	19,200	16,600	13,600	9,600
7	11,200	8,400	22,400	19,400	15,800	11,200
8	12,800	9,600	25,600	22,200	18,100	12,800
9	14,400	10,800	28,800	25,000	20,400	14,400
10	16,000	12,000	32,000	27,700	22,600	16,000
11	17,600	13,200	35,200	30,500	24,900	17,600
12	19,200	14,400	38,400	33,300	27,200	19,200

If used with Choker Hitch multiply above values by $^3/_4$.

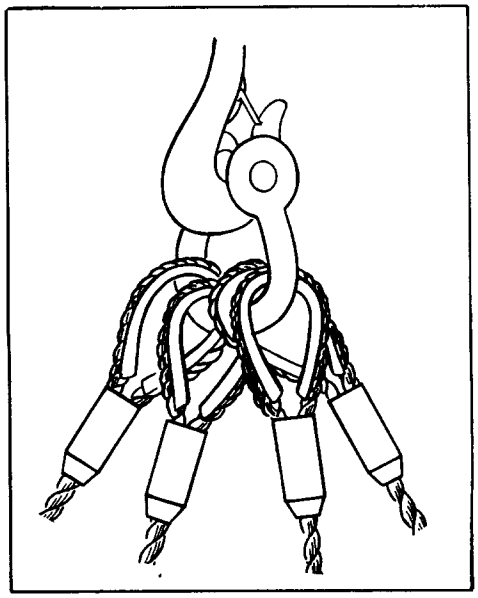


For Double Basket Hitch multiply above values by 2.

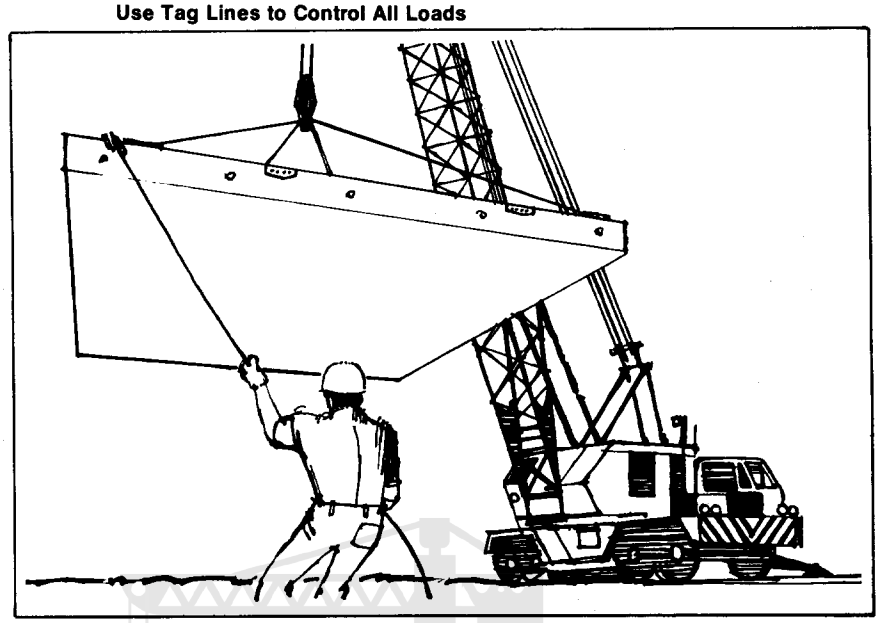


Note: For Safe Working Loads of Endless or Grommet Slings, Multiply Above Values by 2.

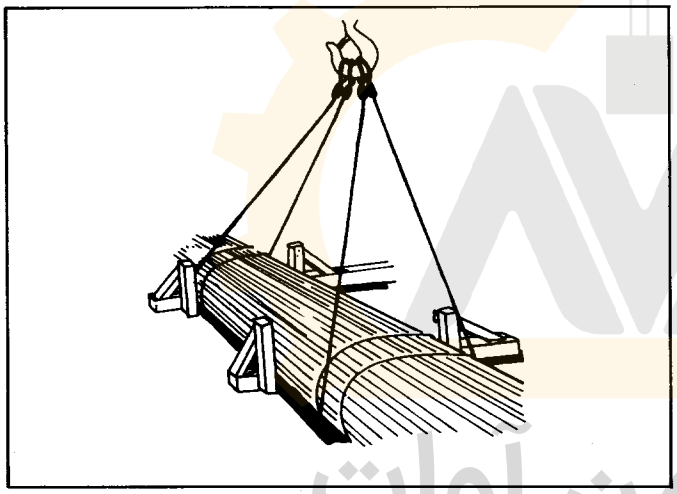
Whenever 2 or more ropes are to be Placed Over a Hook — Use a Shackle



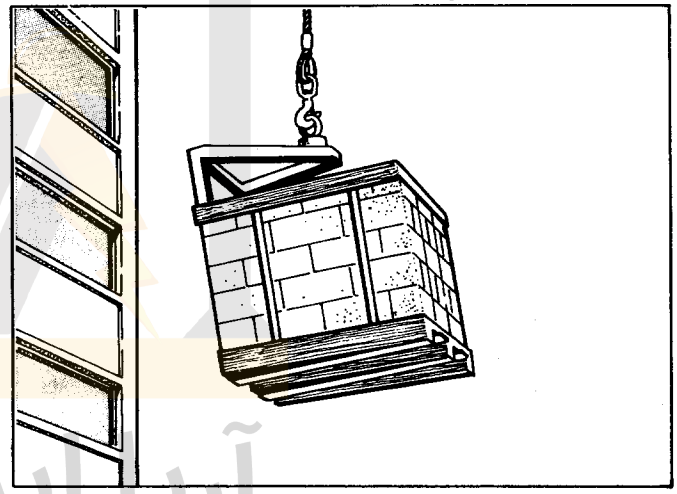
Use Tag Lines to Control All Loads



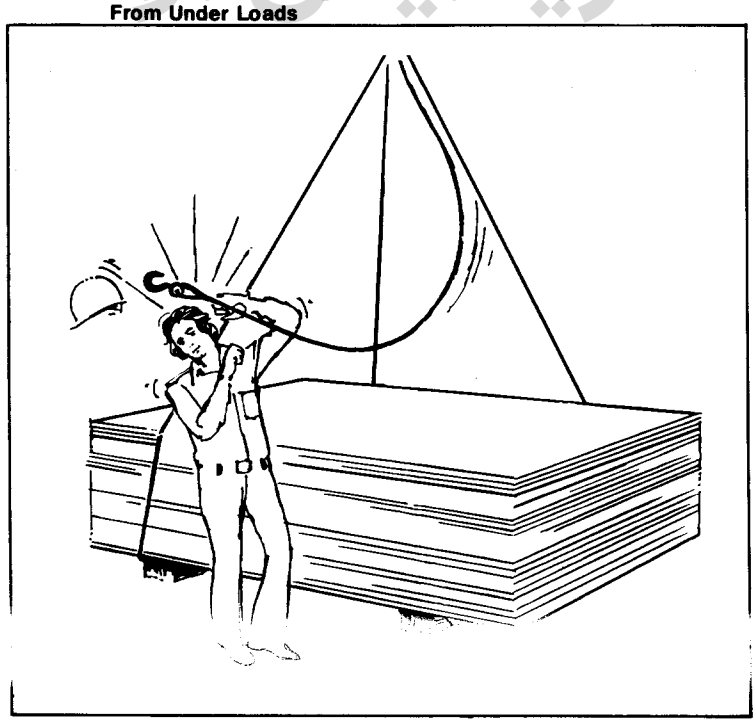
Before Being Unhooked All Loads Must Be Safely Landed and Properly Blocked



Load and Secure All Materials so as to Prevent Any Movement or Possibility of Dislodgement

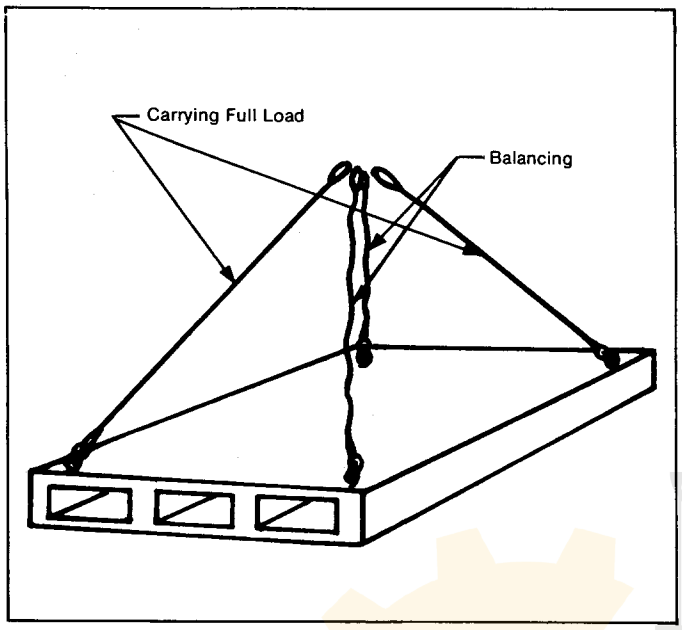


Stay Away From Slings When They Are Being Pulled Out From Under Loads

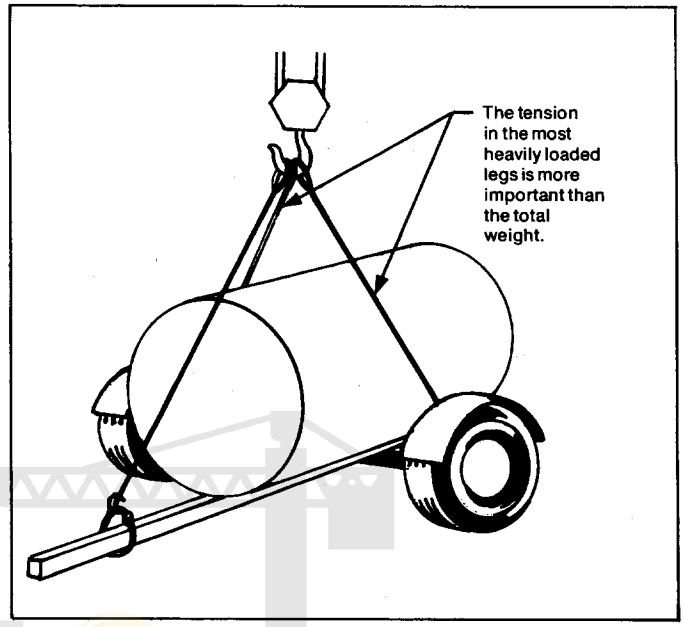


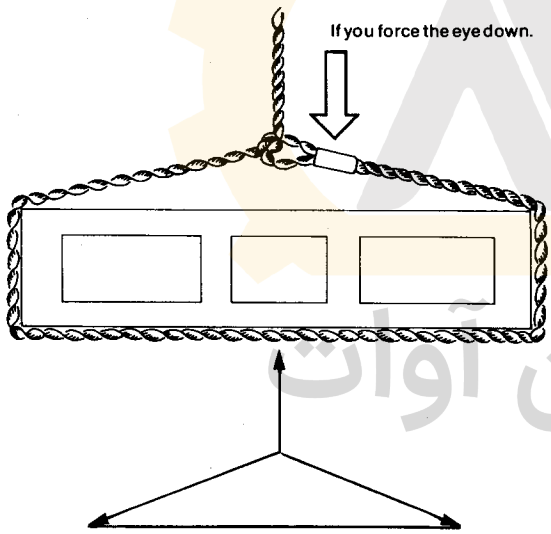
RIGGING PROCEDURES AND PRECAUTIONS

On a Rigid Object the Load Could Be Carried On Only 2 Legs or Sling While Other Legs Only Serve to Balance.

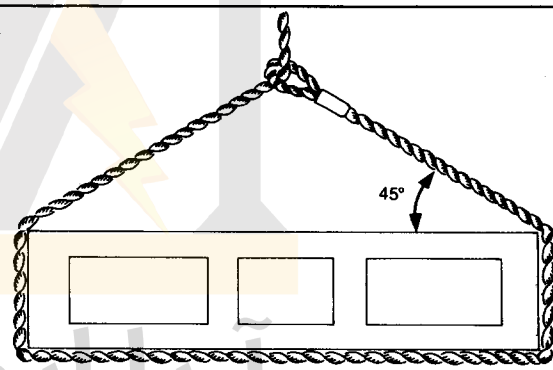


Know What the Load in Each Sling Leg will be Before the Lift is Made





Get severe loading in slings because of low sling angles.



Let the eye ride higher and keep this angle approx. 45° or more.

Incorrect — Cutting action of eye splice on running line.

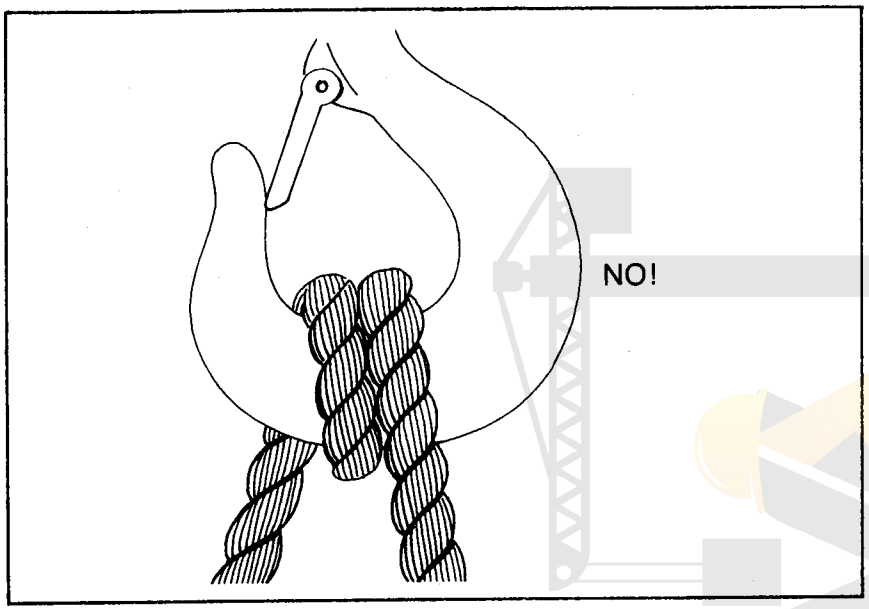
Correct — Use thimbles in the eyes.

Incorrect — Shackle pin bearing on running line can work loose.

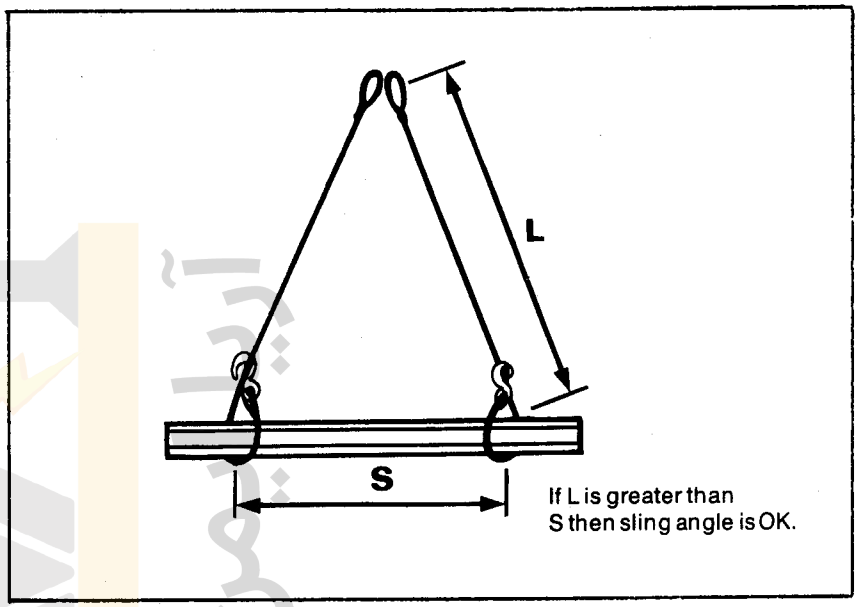
Correct — Shackle pin cannot turn.

RIGGING PROCEDURES AND PRECAUTIONS

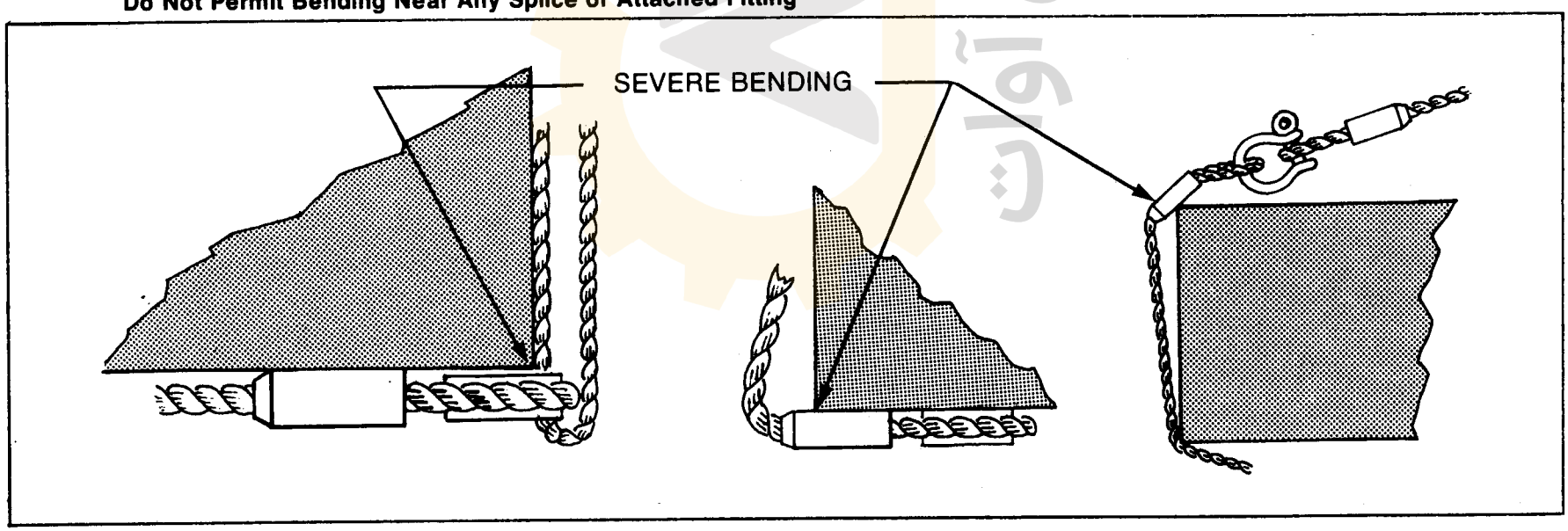
Never Wrap a Rope Around a Hook



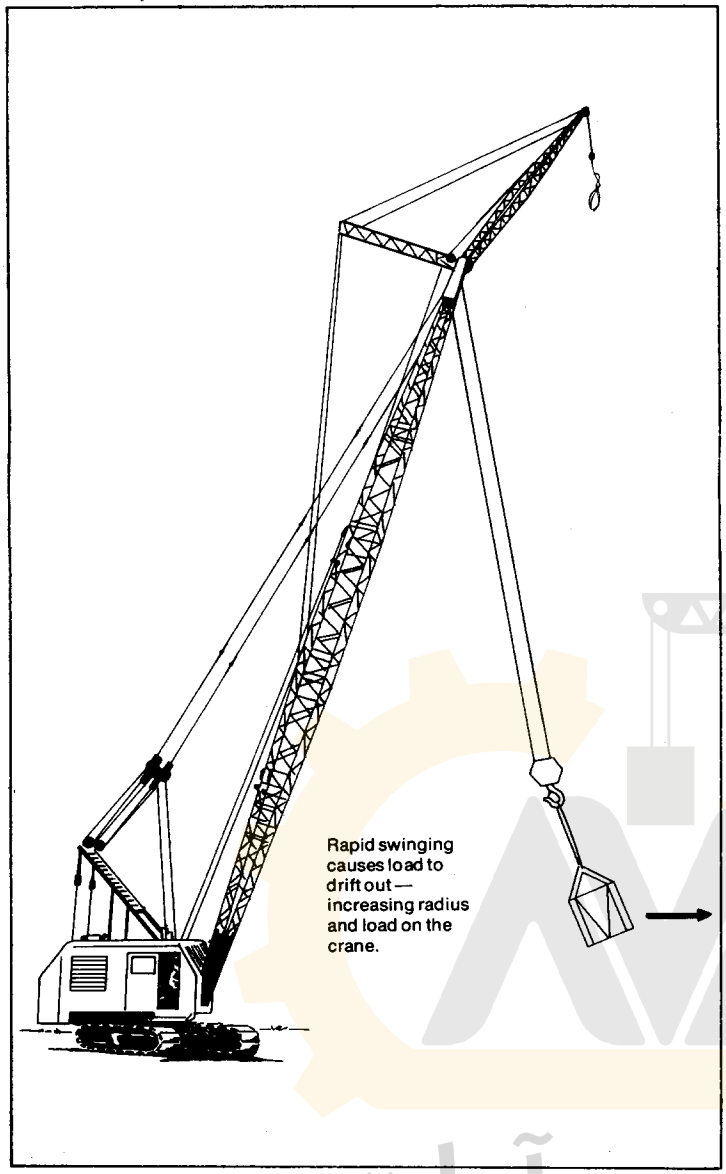
Check on Sling Angle



Do Not Permit Bending Near Any Splice or Attached Fitting



Keep the Load Under Control at All Times



All Rigging Equipment Must be Counted as Part of the Load

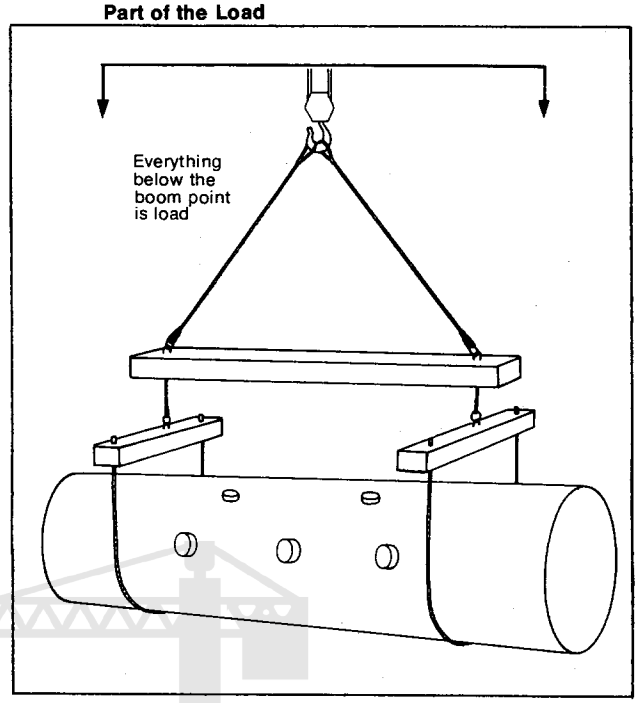
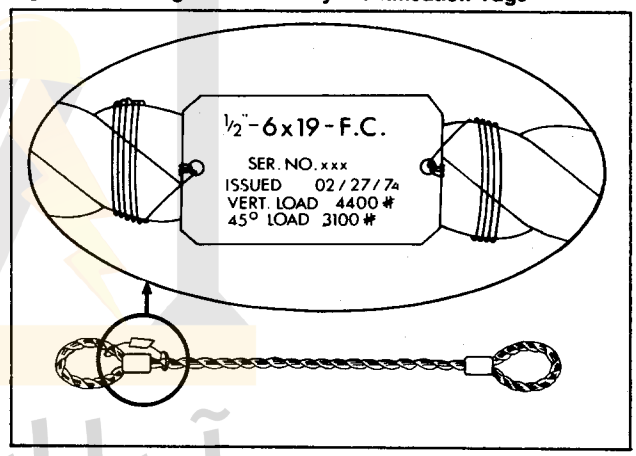
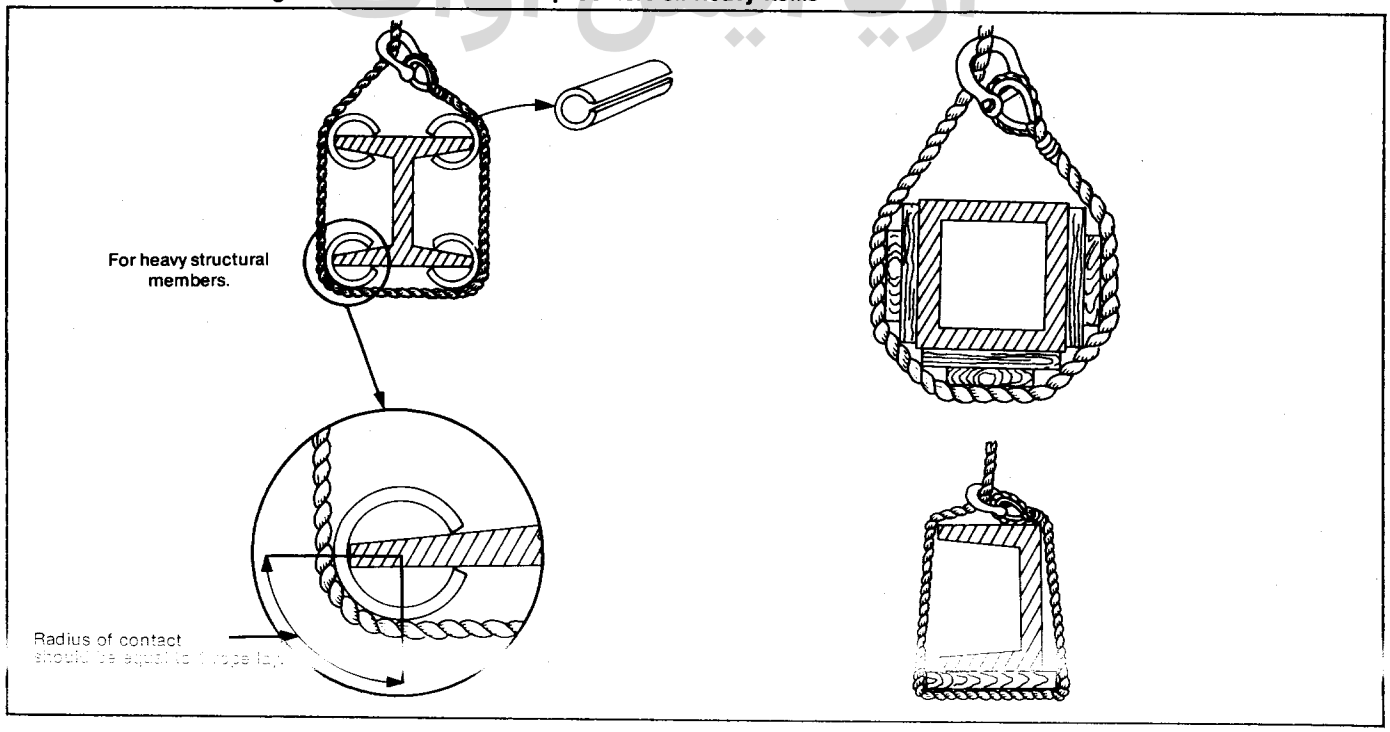


Fig. 7.9 All Slings Should Carry Identification Tags



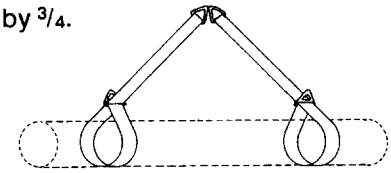
Ensure that Slings are Protected at All Sharp Corners on Heavy Items



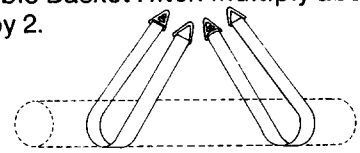
METAL (WIRE OR CHAIN) MESH SLINGS

Sling Width (Inches)	MAXIMUM SAFE WORKING LOADS — POUNDS (Safety Factor = 5)					
	Single Vertical Hitch	Single Choker Hitch	Single Basket Hitch (Vertical Legs)	2-Leg Bridle Hitch & Single Basket Hitch Non Vertical Legs		
				60°	45°	30°
HEAVY DUTY CLASSIFICATION (10 GAUGE MESH)						
2	1,500	1,100	3,000	2,600	2,100	1,500
3	2,700	2,000	5,400	4,700	3,800	2,700
4	4,000	3,000	8,000	6,900	5,600	4,000
6	6,000	4,500	12,000	10,400	8,500	6,000
8	8,000	6,000	16,000	13,800	11,300	8,000
10	10,000	7,500	20,000	17,300	14,100	10,000
12	12,000	9,000	24,000	20,800	17,000	12,000
MEDIUM DUTY CLASSIFICATION (12 GAUGE MESH)						
2	1,350	1,000	2,700	2,300	1,900	1,350
3	2,000	1,500	4,000	3,500	2,800	2,000
4	2,700	2,000	5,400	4,700	3,800	2,700
6	4,500	3,400	9,000	7,800	6,400	4,500
8	6,000	4,500	12,000	10,400	8,500	6,000
10	7,500	5,600	15,000	13,000	10,600	7,500
12	9,000	6,750	18,000	15,600	12,700	9,000
LIGHT DUTY CLASSIFICATION (14 GAUGE MESH)						
2	900	700	1,800	1,600	1,300	900
3	1,400	1,000	2,800	2,400	2,000	1,400
4	2,000	1,500	4,000	3,500	2,800	2,000
6	3,000	2,250	6,000	5,200	4,200	3,000
8	4,000	3,000	8,000	6,900	5,700	4,000
10	5,000	3,750	10,000	8,600	7,100	5,000
12	6,000	4,500	12,000	10,400	8,500	6,000

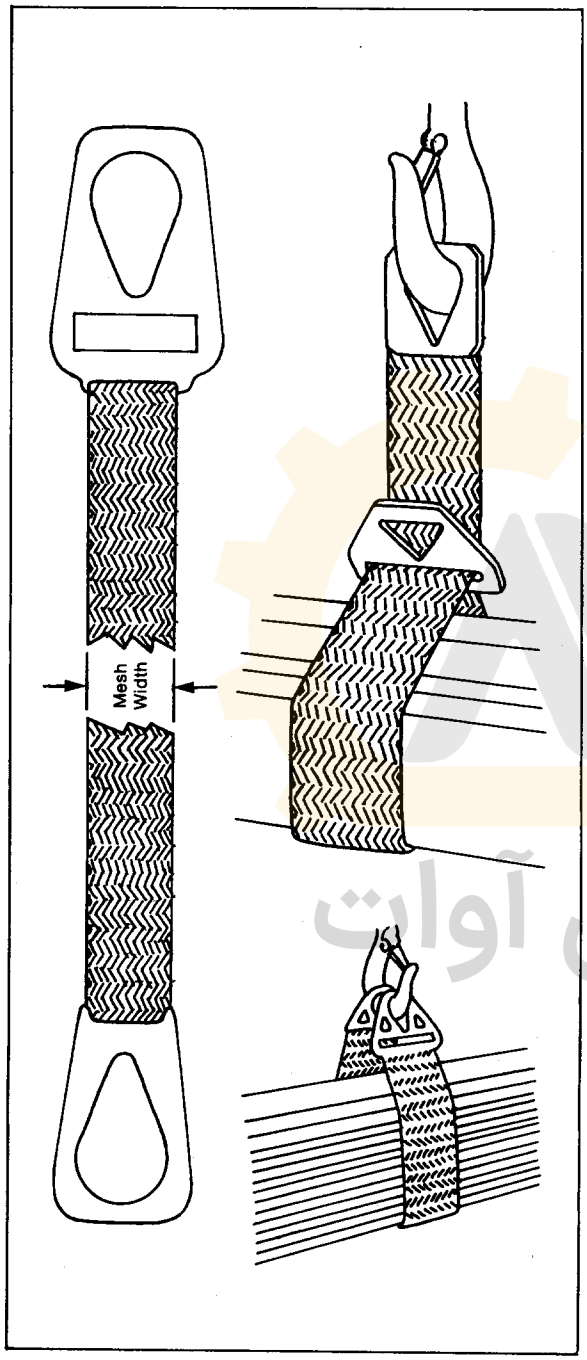
If used with Choker Hitch multiply above values by 3/4.



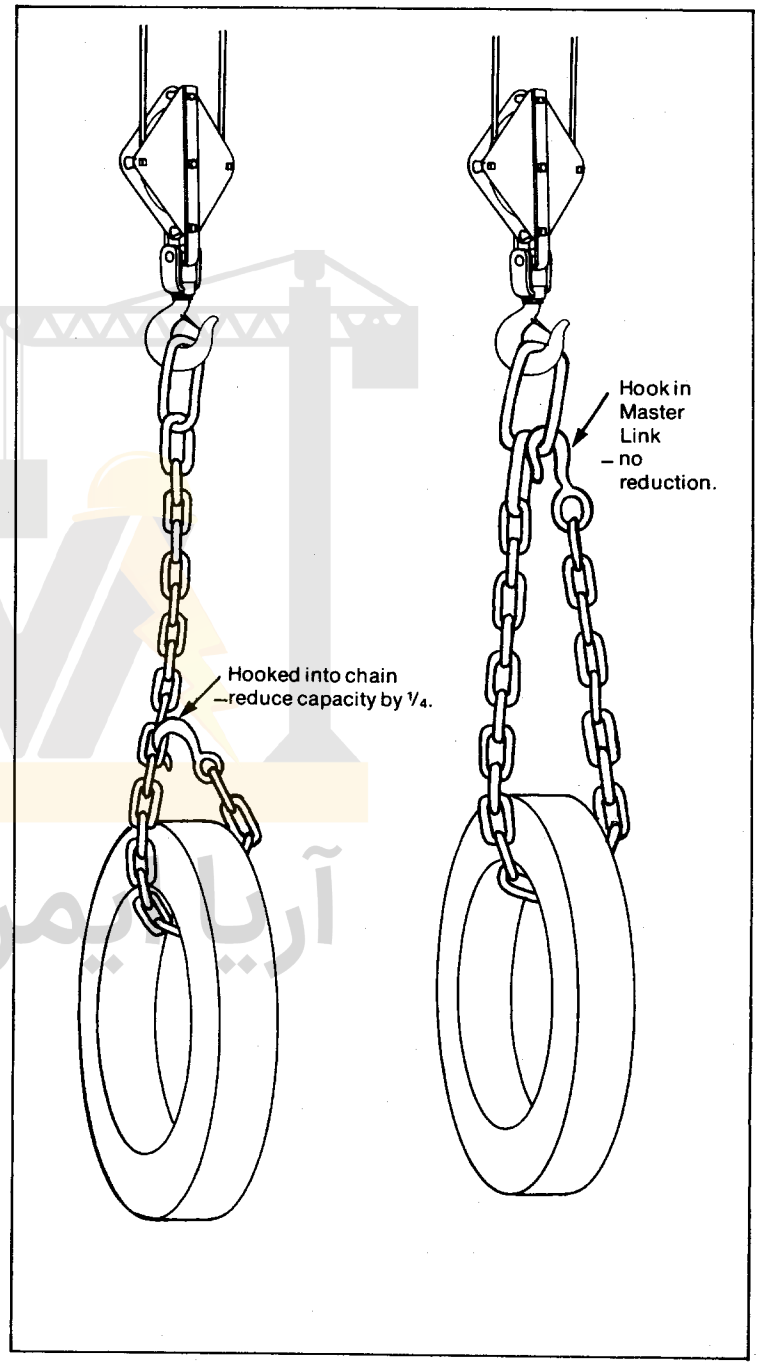
For Double Basket Hitch multiply above values by 2.



Chain Mesh Slings



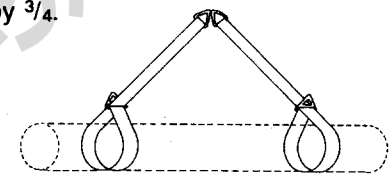
Chain Slings



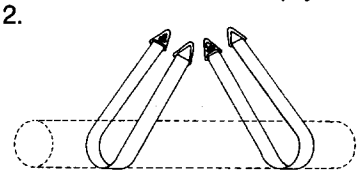
DACRON WEB SLINGS
(5000 lb/in Material)

Web Width (Inches)	MAXIMUM SAFE WORKING LOADS — POUNDS (SAFETY FACTOR = 5) (Eye & Eye, Twisted Eye, Triangle Fittings, Choker Fittings)					
	Single Vertical Hitch	Single Choker Hitch	Single Basket Hitch (Vertical Legs)	2-Leg Bridle Hitch & Single Basket Hitch With Legs Inclined		
				60°	45°	30°
1	1,000	750	2,000	1,730	1,400	1,000
2	2,000	1,500	4,000	3,460	2,830	2,000
3	3,000	2,250	6,000	5,200	4,250	3,000
4	4,000	3,000	8,000	6,950	5,650	4,000
5	5,000	3,750	10,000	8,660	7,070	5,000
6	6,000	4,500	12,000	10,400	8,500	6,000
7	7,000	5,250	14,000	12,100	9,900	7,000
8	8,000	6,000	16,000	13,850	11,300	8,000
9	9,000	6,750	18,000	15,600	12,700	9,000
10	10,000	7,500	20,000	17,350	14,100	10,000
11	11,000	8,250	22,000	19,100	15,500	11,000
12	12,000	9,000	24,000	20,800	17,000	12,000

If used with Choker Hitch multiply above values by 3/4.



For Double Basket Hitch multiply above values by 2.

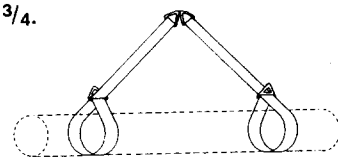


Note: For Safe Working Loads of Endless or Grommet Slings, Multiply Above Values by 2.

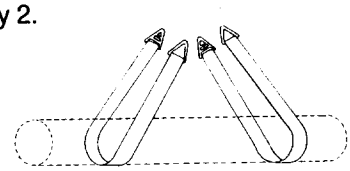
NYLON WEB SLINGS
(6000 lb/in Material)

Web Width (Inches)	MAXIMUM SAFE WORKING LOADS — POUNDS (SAFETY FACTOR = 5) (Eye & Eye, Twisted Eye, Triangle Fittings, Choker Fittings)					
	Single Vertical Hitch	Single Choker Hitch	Single Basket Hitch (Vertical Legs)	2-Leg Bridle Hitch & Single Basket Hitch With Legs Inclined		
				60°	45°	30°
1	1,200	900	2,400	2,080	1,700	1,200
2	2,400	1,800	4,800	4,160	3,400	2,400
3	3,600	2,700	7,200	6,240	5,100	3,600
4	4,800	3,600	9,600	8,300	6,800	4,800
5	6,000	4,500	12,000	10,400	8,500	6,000
6	7,200	5,400	14,400	12,500	10,200	7,200
7	8,400	6,300	16,800	14,550	11,900	8,400
8	9,600	7,200	19,200	16,600	13,600	9,600
9	10,800	8,100	21,600	18,700	15,300	10,800
10	12,000	9,000	24,000	20,800	17,000	12,000
11	13,200	9,900	26,400	22,900	18,650	13,200
12	14,400	10,800	28,800	25,000	20,400	14,400

If used with Choker Hitch multiply above values by $^{3}/_{4}$.



For Double Basket Hitch multiply above values by 2.



Note: For Safe Working Loads of Endless or Grommet Slings, Multiply Above Values by 2.