SECTION 2

Wire Rope Slings

NOTES

Lift Engineering Guidelines

Every Lift Uses 1 of 3 Basic Hitches

STRAIGHT, or vertical, attachment is simply using a sling to connect a lifting hook to a load. Full rated lifting capacity of the sling may be utilized, but must not be exceeded. Whenever a single sling is used in this manner, a tagline should be used to prevent load rotation which may cause damage to the sling.

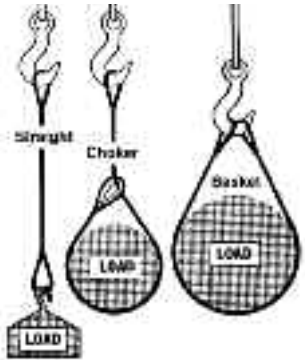
When two or more slings are attached to the same lifting hook in straight, or vertical, manner, the total hitch becomes, in effect, a lifting bridle, and the load is distributed equally among the individual slings.

CHOKER hitches reduce lifting capability of a sling, since this method of rigging affects ability of the wire rope components to adjust during the lift. A choker is used when the load will not be seriously damaged by the sling body – or the sling damaged by the load, and when the lift requires the sling to snug up against the load.

The diameter of the bend where the sling contacts the load should keep the point of choke against the sling BODY – never against a splice or the base of the eye. When a choke is used at an angle of less than 135 degrees, the sling rated capacity must be adjusted downward to compensate for further loss of capability.

A choker hitch should be pulled tight before a lift is made – NOT PULLED DOWN DURING THE LIFT. It is also dangerous to use only one choker hitch to lift a load which might shift or slide out of the choke.

BASKET hitches distribute a load equally between the two legs of a sling – within limitations described below. Capacity of a sling used in a basket is affected by the bend, or curvature, where the sling body comes in contact with the load – just as any wire rope is affected and limited by bending action, as over a sheave.



Calculating the Load on Each Leg of a Sling

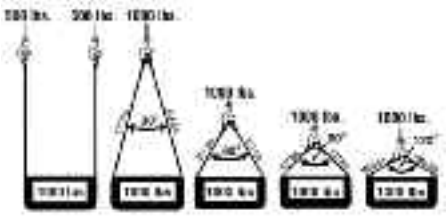
As the included angle between the legs of a sling increases, the load on each leg increases. The effect is the same whether a single sling is used as a basket, or two slings are used with each in a straight pull, as with a 2-legged bridle.

Anytime pull is exerted at an angle on a leg - or legs - of a sling, the load per leg can be determined by using the data in the table shown on this page. Proceed as follows to calculate this load - and determine the rated capacity required of the sling, or slings, needed for a lift.

1. First, divide the total load to be lifted by the number of legs to be used. This provides the load per leg if the lift were being made with all legs lifting vertically.
2. Determine the angle between the legs of the sling. When 3 or more legs are used, the angle will be TWICE the angle between one leg and an imaginary line extending straight down from the lifting hook.
3. Then MULTIPLY the load per leg (as computed in No. 1) by the Load Factor for the leg angle being used (from the table at right) - to compute the ACTUAL LOAD on each leg for this lift and angle. THE ACTUAL LOAD MUST NOT EXCEED THE RATED SLING CAPACITY.

Thus, in drawing three (sling angle at 60°):
1000 ÷ 2 = 500 (Load Per Leg if a vertical lift)
500 x 1.154 = 577 lbs. = ACTUAL LOAD on each leg at the 60° included angle being used.

In drawing four (sling angle of 90°):
1000 ÷ 2 = 500 (Load Per Leg if a vertical lift)
500 x 1.414 = 707 lbs. = ACTUAL LOAD on each leg at the 90° included angle being used.



Angles of Bridles

The leg angles of bridles with 3 or more legs must be measured differently than the angles of 2-legged hitches. First, establish a vertical line downward from the lifting hook as it would be positioned at the start of the lift. Measure the greatest angle between this line and any one leg. Multiplying this angle (known technically as the "half included angle") by TWO yields the leg angle which is used to calculate the ACTUAL Load on each leg of the bridle.

Leg Angle (degrees)	Load Factor
0	1.000
10	1.003
20	1.015
30	1.035
40	1.064
50	1.103
60	1.154
70	1.220
80	1.305
90	1.414
100	1.555
110	1.743
120	2.000

Effect of Angles

Various sling manufacturers refer in their specification tables to leg angles of slings during lifts - since these angles have a direct relationship to lifting capability of a sling. Regardless of how the sling angle may be stated, or the method used to compute stress in a sling leg, the load rating–or Rated Capacity–of the sling is the same. Capacity does not change–but stresses on sling legs change with rigging angles.

Much misunderstanding results because the carrying capacity of a sling leg is reduced by the rigging angle. What happens is that the operator is lifting the load straight up (vertical) while the sling legs are pulling at an angle, thereby causing a disadvantage.

For quick figuring in the shop, a 30 degree leg angle (measured between one sling leg and a plumb line suspended from the hook) causes a loss in lifting capacity of 15%. A 45 degree angle reduces capacity by 30%... and a 60 degree angle, 50%. This rule of thumb is not 100% accurate, but is easy to remember and slightly on the safe side.

It is always good practice, within limits, to keep the sling leg angle ("included" or "half included", as illustrated) as small as possible. The length and width of the load sling length, and available headroom are determining factors in this sling angle.

It is neither economical nor good practice to exceed a 60-degree sling leg angle. Angles greater than 60 degrees not only build up tension in the sling legs out of all proportion to the weight of the load, they also create a much greater "in-pull" on the ends of the load. This produces an eccentrically loaded column effect, as an engineer would describe it - meaning simply that long, slender objects have a tendency to buckle. Angles greater than 60 degrees indicate some thought should be given to the use of a lifting beam or other device in connection with the lift.

Studying typical sling charts readily reveals that lifting capacities on slings are misleading unless the sling angle is stated. The same sling that will handle 10 tons at a 15-degree "included" leg angle will only handle 5 tons if this angle is increased to 60-degrees.

Good Sling Practice

Regardless what type of sling may be employed, there are accepted good working rules which will help increase useful sling life - as well as improve safety. These include:

1. Use the proper sling for the lift. Whether single-part, multi-part, Braided or Cable Laid, the proper sling is the one with the best combination of work and handling features - of the proper length and rated capacity for the situation.
2. Start and stop slowly. Crane hooks should be raised slowly until the sling becomes taut and the load is suspended. Lifting or lowering speed should be increased or decreased gradually. Sudden starts or stops place heavier loads on a sling - comparable to jamming the brakes on a speeding automobile. A rule of thumb: Shock loads can double the stress on a sling.
3. If possible, set the load on blocks. Pulling a sling from under a load causes abrasion and "curling"–making the sling harder to handle on the next lift while reducing strength through loss of metal.
4. Sharp corners cut slings. Use protector arcs, blocking, planks, and the like between sharp comers and the sling body.
5. Store in a dry room. Moisture is a natural enemy of wire rope–as are acid fumes and other caustic gases.
6. Avoid handling hot material or objects in direct contact with the sling. Strength goes down as temperature goes up!
7. Dropping casting, tools or heavy objects on slings, or running over them with trucks, can cause damage. Always hang slings when not in use.
8. Use hooks properly. "Point loading" reduces hook capacity. Pull should be straight in the line of lift.

Lift Engineering Guidelines

Selecting a Sling

The following is presented as a guide only to help in selection of a sling for a lift.

1. Determine the Load: The weight of the load must be known. This is always the starting point.
2. Decide the Hitch: Shape and bulk of the load must be accommodated as well as weight. Determine whether a straight attachment at some point on the load, a choker around the load, or some form of basket hitch will best control the load during the lift.
3. Adequacy of Lifting Device: The lifting device must have adequate capacity for making the lift, and provide any maneuverability required once the load is hoisted.
4. Room to Lift: Make certain the lifting device has sufficient headroom to raise the load to the height required. Headroom will affect the length of sling.
5. Length of Sling: By applying your decision on the type of hitch to knowledge of the headroom offered by the lifting device, the length of sling can be calculated.
6. Use Rated Capacity Chart: Always double check that the sling type and diameter you choose, when rigged at the angle determined by the length of the sling, or the specific type of hitch, will handle the load.

Attaching the sling and completing the lift should be an orderly procedure without "surprises" when these steps have been followed. Two further precautions should be noted, however.

First, plan to protect both load and sling from damage at sharp corners, etc. Wooden blocks and pads should be provided at the lift site. A protective pad should be used anytime a sling passes around a sharp corner.

Last–but no means unimportant by being last–every sling should be visually examined from end to end BEFORE EVERY LIFT. It must be kept always in mind that the manufacturer's Rated Capacity applies only to a new sling in "unused" condition. A sling should be carefully examined to determine that it is in as nearly new condition as practicable before each lift.

There are specific standards on the use and care of slings in industries such as shipping and construction, and these provide some guidance for sling inspectors. Consensus standards published as ANSI B30.9 are particularly helpful.

ANSI Standard B30.9 specifies that a wire rope sling should be removed from service any time any of the following conditions are detected:

1. Ten randomly distributed broken wires in one rope lay, or five broken wires in one strand in one rope lay.
2. Kinking, crushing, bird caging or any other damage resulting in distortion of the wire rope structure.
3. Evidence of heat damage.
4. End attachments that are cracked, deformed, or worn.
5. Hooks that have been opened more than 15% of the normal throat opening measured at the narrowest point, or twisted more than 10 degrees from the plane of the unbent hook.
6. Corrosion of the rope or end attachments.

It is apparent from the foregoing that inspection of a wire rope sling to meet these removal criteria requires more than a casual understanding of wire rope design and manufacture, and the responsibility for daily inspections must be in the hands of trained personnel.

Most of the foregoing applies equally to any type of sling and careful inspection by a trained inspector is necessary for safe sling use. If you require training for any type of sling inspection, Hanes Supply will provide you with the opportunity. Call for information regarding all of our educational courses in slings.

Sling Eye Design

Sling eyes are designed to provide what amount to "small inverted slings" at the ends of the sling body. Therefore, the width of the eye opening will be affected by the same general forces which apply to legs of a sling rigged as a basket.

A sling eye should never be used over a hook or pin with a body diameter larger than the natural width of the eye. Never force an eye onto a hook.

On the other hand, the eye should always be used on a hook or pin with at least the nominal diameter of the rope-since applying the D/d Ratio shows an efficiency loss of approximately 50% when the relationship is less than 1/1.

D/d Ratios Apply to Slings

When rigged as a basket, DIAMETER of the bend where a sling contacts the load can be a limiting factor on sling capacity. Standard D/d ratios - where "D" is the diameter of bend, and "d" the diameter of the rope are applied to determine efficiency of various sling constructions, as indicated below:

- Mechanically Spliced, Single Part Slings: 25 times rope diameter.
- Hand Spliced, Single Part Slings: 15 times rope diameter.
- Braided Multi-Part Slings of 6 Parts: 25 times component rope diameter.
- Braided Multi-Part Slings of 8 Parts: 25 times component rope diameter.
- Helically Laid Multi-Part Slings: 25 times component rope diameter.
- Cable Laid Slings: 10 times sling body diameter.
- Hand Tucked Grommets and Mechanically Joined Grommets: 5 times sling body diameter.*

Sling Usage Dictates Sling Body Construction

Whether to use a single-part sling... one made of a single wire rope in the sling body... or a multi-part sling (several ropes in the body) is usually the first decision to make after determining sling length and capacity for a lift.

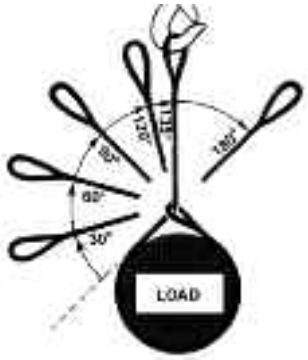
The starting point for this decision involves the handling characteristics of the sling more than any other factor. Based on capacity alone, multi-part slings will be more flexible... more easily handled... than single-part slings. The larger the capacity of a sling, the more important this becomes... to the point it becomes unrealistic to build big capacity slings from single, very large wire ropes. Multi-part slings provide the only practical means for obtaining extremely heavy lift capacity... in hundreds of tons.

Various approaches to building multi-part slings have been developed; the most common of these are Braided and Cable Laid. These are described in detail elsewhere in this catalog.

Braided or plaited, slings are often selected because this construction provides a gripping effect which reduces load slippage and rotation.

In the design of a sling, rope engineers must seek a balance between strength, handling characteristics, and number of parts... since there is a tendency to lose strength as more parts are added to increase flexibility.

Choker Hitch Rated Capacity Adjustment



For wire rope slings in choker hitch when angle of choke is less than 120°.

Angle of choke (Degrees)	Rated Capacity Percent*
OVER-120	100
90-120	87
60-89	74
30-59	62
0-29	49

*Percent of sling rated capacity in a choker hitch.

If a load is hanging free, the normal choke angle is approximately 135 degrees. When the angle is less than 135 degrees an adjustment in the sling rated capacity must be made. Choker hitches at angles greater than 135 degrees are not recommended since they are unstable. Extreme care should be taken to determine the angle of choke as accurately as possible.

In controlled tests, where the angle was less than 120 degrees, the sling body always failed at the point of choke when pulled to destruction. Allowance for this phenomenon must be made anytime a choker hitch is used to shift, turn or control a load, or when the pull is against the choke in a multi-leg lift.

Minimum Sling Body Length

This is the length of wire rope between splices, sleeves or fittings. Generally the minimum body length is equal to ten (10) times the sling body diameter. This allows approximately one and one half (1-1/2) rope lays between splices. For Multi-part slings the minimum body length between splices is equal to forty (40) times the component rope diameter.

Rigger Guidelines

Rigger's Check List

1. **Analyze and Measure**–Determine the total weight to be moved as well as exactly how far it is to move and how high it must be lifted.
2. **Determine the Hitch**–Decide how the load is to be connected to the lifting hook and how the sling will grip, or be attached to, the load.
3. **Select the Sling**–In addition to adequate Rated Capacity for the angles and hitch involved, the sling body should be of the type and style best suited to handling this specific load. Select a sling with proper end attachments or eye protection, as well as attachment hardware such as clevises.
4. **Inspect the Sling–**Make a good visual check of the sling you select to determine if it is in good condition and capable of making the lift. Refer to prevailing OSHA and ANSI regulations for inspection criteria.
5. **Rig Up, Not Down–**Always attach the sling to the load first, then attach it to the hook.
6. **Check Everything–**Before attempting a lift, take a light strain on the rigging, checking to see that blocking, sling and load protection and all safety devices are in place.
7. **Stand Clear and Lift–**Let the lifting device and rigging do the job–don't use brute strength to prevent swinging or movement. Use a tagline, or tether, to control any movement. Keep all hands and toes out from under the load when it is suspended.
8. **Don't Jerk!–**Lift slowly and with a steady application of power.
9. **Put It Away!–**After you've completed the job, check the sling for any damage (If it's damaged, red tag it immediately or advise the sling inspector.), then return it to the sling storage rack for safekeeping until next usage.

Care of Wire Rope Slings

Care of Slings

The amount of care and proper maintenance a sling receives will go a long way in determining its service life. Following are guidelines which experience has shown helpful.

Storage: Proper storage requires that slings be kept in an area where they will not be exposed to water, extreme heat, or corrosive fumes, liquids, and sprays, of being run over or kinked.

Slings should never be left beneath loads or lying around where they may be damaged. All slings, when not in use, should be kept on a rack. Use of a rack minimizes accidental damage and allows easier monitoring of condition between regular inspections. A rack will also save time by allowing larger slings to be picked up and returned by crane, thereby reducing manhandling.

Effects of Temperature

All wire rope should be protected from extremes of temperature. The accepted rules are: Fiber core slings should never be exposed to temperature in excess of 200°F. Steel cored slings should never be used at temperatures above 400°F. or below minus -60°F.

It is not always easy to detect when wire rope has been damaged by heat. The most common visual signs are loss of lubrication and discoloration of wires.

The best practice to follow is that if there is the slightest suspicion that a sling was subjected to high temperatures, it should be taken out of service immediately. If it is absolutely necessary to use slings outside of the above temperature range, the sling manufacturer should be consulted.

Basic Inspection Criteria For Wire Rope Slings

The goal of a sling inspection is to evaluate remaining strength in a sling which has been used previously to determine if it is suitable for continued use.

Specific inspection intervals and procedures are required by the Occupational Safety and Health Act (OSHA) and by ANSI B30.9 Regulations, and the responsibility for performance of inspections is placed squarely upon the sling user by Federal Legislation.

As a starting point, the same work practices which apply to all "working" wire ropes apply to wire rope which has been fabricated into a sling. Therefore, a good working knowledge of wire rope design and construction will be not only useful but essential in conducting a wire rope sling inspection.

But because wire rope is a rather complex machine, no precise rules can be given to determine exactly when a wire rope sling should be replaced. There are many variables, and all must be considered.

OSHA specifies that a wire rope sling shall be removed from service immediately if ANY of the following conditions are present:

1. **Broken Wires:** For single-part slings, 10 randomly distributed broken wires in one rope lay, or five broken wires in one strand of one rope lay. For multi-part slings these same criteria apply to each of the component ropes. For this inspection, a broken wire shall only be counted once; that is, each break should have two ends.
2. **Metal Loss:** Wear or scraping of one-third the original diameter of outside individual wires. This is quite difficult to determine on slings and experience should be gained by the inspector by taking apart old slings and actually measuring wire diameters.
3. **Distortion:** Kinking, crushing, birdcaging or other damage which distorts the rope structure. The main thing to look for is wires or strands that are pushed out of their original positions in the rope. Slight bends in a rope where wires or strands are still relatively in their original positions would not be considered serious damage. But good judgment is indicated.
4. **Heat Damage:** Any metallic discoloration or loss of internal lubricant caused by exposure to heat.
5. **Bad End Attachments:** Cracked, bent or broken end fittings caused by abuse, wear or accident.
6. **Bent Hooks:** No more than 15 percent over the normal throat openings, measured at the narrowest point, or twisting of more than 10 degrees is permissible.
7. **Metal Corrosion:** Severe corrosion of the rope or end attachments which has caused pitting or binding of wires should be cause for replacing the sling. Light rusting usually does not affect strength of a sling, however.

   In addition to these seven conditions specified by OSHA, the following are also important:
8. **Pulled Eye Splices:** Any evidence that eye splices have slipped, tucked strands have moved, or pressed sleeves show serious damage may be sufficient cause to reject a sling.
9. **Unbalance:** A very common cause of damage is the kink which results from pulling through a loop while using a sling, thus causing wires and strands to be deformed and pushed out of their original position. This unbalances the sling, reducing its strength.

Disposition of Retired Slings: the best inspection program available is of no value if slings which are worn out and have been retired are not disposed of properly. When it is determined by the inspector that a sling is worn out or damaged beyond use, it should be tagged immediately *DO NOT USE*. This sling should then be destroyed as soon as possible by cutting the eye and fittings from the rope with a torch. This will help assure that an employee will not mistakenly use a sling which has been retired from service.

It should also be obvious that a good inspection program will not only provide safer lifting conditions, but will also extend the life of slings and thereby reduce lifting costs.

Federal Work Rules Require Specific Inspection Intervals

Government regulations are also specific on WHEN to inspect.

Both ANSI Standard B30.9 and OSHA require that wire rope slings receive two types of inspections: a DAILY visual inspection, and additional inspections where service conditions warrant.

Daily visual inspections are intended to detect serious damage or deterioration which would weaken the sling. This inspection is usually performed by the person using the sling in a day-to-day job. He should look for obvious things, such as broken wires, kinks, crushing, broken attachments, severe corrosion, etc.

Additional inspections should be performed at regular intervals based on, (1) frequency of sling use, (2) severity of service conditions, (3) nature of lifts, and (4) prior experience based on service life of slings used in similar circumstances.

It is required that these additional inspections be carried out by a designated person who must have good knowledge of wire rope. An accurate WRITTEN and dated record of all conditions observed should be kept. Any deterioration of the sling which could result in appreciable, loss of original strength should be carefully noted, and determination made on whether further use would constitute a safety hazard.

How to Inspect

Precisely how to make proper, adequate inspections is not detailed by OSHA–yet it is in the HOW of inspection that the big difference between a good inspection and something less become apparent.

Inspection should follow a systematic procedure:

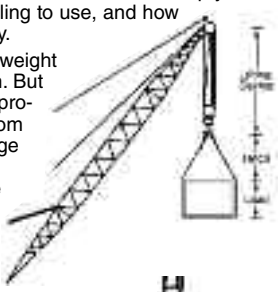
1. First, it is necessary that all parts of the sling are readily visible. The sling should be laid out so every part is accessible.
2. Next, the sling should be sufficiently cleaned of dirt and grease so wires and fittings are easily seen. This can usually be accomplished with a wire brush or rags.
3. The sling should then be given a thorough, systematic examination throughout its entire length, paying particular attention to sections showing the most wear.
4. Special attention should also be paid to fittings and end attachments, and areas of the sling adjacent to these fittings.
5. When the worst section of a sling has been located. this area should then be carefully checked against the OSHA criteria.
6. Label or identify slings that are inspected.
7. Keep records of inspections that include dates and corresponding conditions of slings.
8. Dispose immediately of slings that are rejected. A knowledgeable inspector will also insist on proper storage for out-of-use slings–to make his job easier if not for the good of the slings. Inspections are much easier–and probably more thorough–when slings are available for inspection in an orderly arrangement, out of the weather, away from heat and dirt.

Rigger Guidelines

On the following pages are some useful tips to help the rigger do his job more efficiently and safely. Prevailing work rules and government regulations place full responsibility for proper performance upon the rigger, so it is his duty to be familiar with the condition and capability of all tools and equipment used, as well as techniques employed. One basic rule always applies: Always know... never guess.

Each lift may be divided into three parts, providing a convenient plan for proceeding:

1. **The Lifting Device**–Know its capability and limitations, and its condition. When was it last inspected? If in doubt about capacity, check the placard.
2. **The Hitch**–Here is where the rigger can exercise ingenuity... but it's also the easiest place to make a mistake. This book can help you decide which sling to use, and how to rig it properly.
3. **The Load**–The weight must be known. But you must also protect the load from possible damage by the slings... and protect the slings from damage by the load.



Is the lifting device adequate?

Check the placard on the crane or hoist, and then answer three questions:

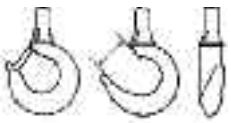
1. Is capacity adequate for this lift?
2. Will it lift high enough?
3. Is horizontal reach adequate?

Check the hook and reeving.

1 Are sheaves properly rigged? If multi-part reeving, will it support the load?

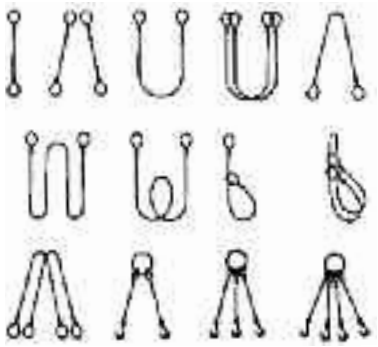
2 Is the hook the right size so sling eye won't be distorted when put over the hook?

3 Check for cracks in bowl of the hook, and for evidence of point loading or bending to one side of 15% or more.



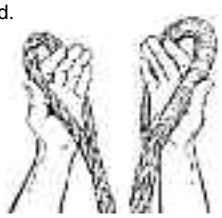
Before you select a sling for a specific lift, determine the most effective hitch to do the job, protect the load, and protect the sling. One of three basic hitches will usually do the job.

The type of hitch you select may determine the type of sling body that will best do the job, as well as the length of sling that will be needed. Lifting height, overhead clearance and hook travel will affect choice of hitch and length of sling.

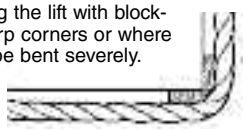


Choose a sling body type which will best support the load while providing adequate rated capacity. The proper choice will provide:

1. Lifting capacity needed.
2. Proper D/d Ratio.
3. Handling characteristics needed for rigging.
4. Minimal damage to the sling.
5. Minimal damage to the load.

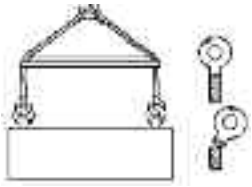


Protect the sling during the lift with blocking or paddling at sharp corners or where the sling body would be bent severely.



Use a spreader bar between legs of a sling to prevent excessive side pressure on the load by the sling during the lift.

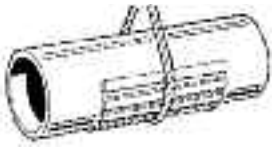
When attaching a sling to eye bolts, always pull on line with the bolt axis. When hitching to bolts screwed into or attached to a load, a side pull may break the bolts.



Use a shackle in the sling eye during a choke to protect sling body against excessive distortion. Always put shackle pin through sling eye, rather than against the sling body–since sliding movement of sling body could rotate pin, causing it to come loose.

A sliding hook choker is superior to a shackle or unprotected eye, since it provides a greater bending radius for the sling body.

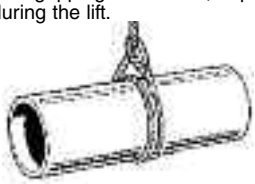
Use blocking or padding to protect hollow vesseis, loose bundles and fragile items from scuffing and bending. Remember that blocking becomes part of the lift, and must be added to total weight on the sling.



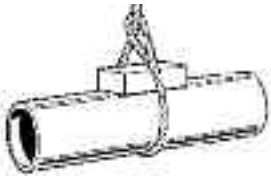
When lifting crates or wooden boxes with a basket hitch, be sure load can withstand side pressure as tension is applied to sling. Use spreader bars and corner protectors to prevent damage to contents.

When lifting a bundled load with a single sling near the center of gravity, a choke is more effective than a basket hitch to prevent unbalance and slipping of the load in the sling.

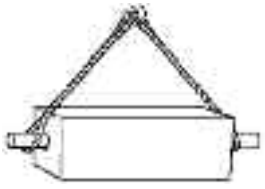
Some riggers will use a double wrap around the load, for 360° gripping of the load, to prevent slippage during the lift.



You can reduce the angle of a choke with a wooden block, or blocks, between the hitch and the load. This also increases the angle between the two legs to improve sling efficiency.

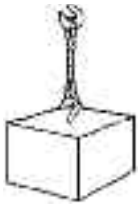


When rigging two or more straight slings as a bridle, select identical sling constructions of identical length–with identical previous loading experience. Normal stretch must be the same for paired slings to avoid overloading individual legs and unbalancing the load during the lift.



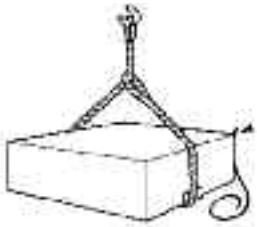
Single-part hand-spliced slings must not be permitted to rotate when rigged in a straight, vertical hitch. Rotation can cause the splice to unlay and pull out, resulting in dropping of the load.

WARNING
Hand-spliced slings should not be used in lifts where the sling may rotate and cause the wire rope to unlay.

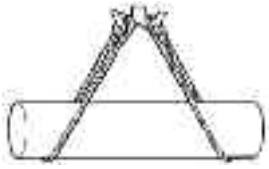


Rigger Guidelines

Anytime a load is lifted beyond arm's reach with a single-part load line or straight eye-and-eye sling, use a tagline to prevent load rotation. If a wire rope is permitted to rotate, the strands may unlay and the rope's capacity will be reduced.



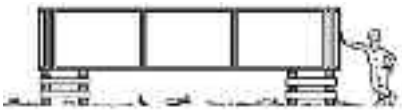
Two basket hitches can be rigged with two slings to provide better balance for long loads. Be sure that slings cannot slide toward one another along the load when the lift is made.



Use an equalizing bar with double basket hitches to reduce tendency of slings to slide together, and to keep loads level. By adjusting the hook point and using a come-along or chain block to support the heavy end, the load can be kept level during the lift.

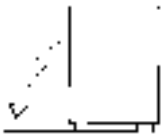
Proper Use of Cribbing

Incorrect



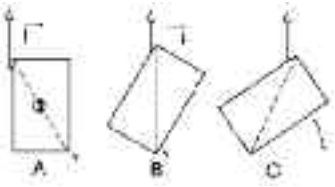
Correct

To turn or reposition a load, either one or two lifting devices may be employed. Always use a choker hitch or a single-leg direct attachment. Never attempt to turn a load with a basket, since the load will slide in the hitch, against the sling body– resulting in damage to both the sling and the load, and possibly a dropped load.

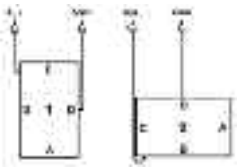


One Hook Load Turning

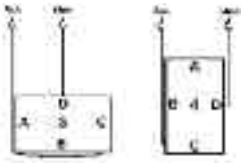
To turn a load with one hook, attach the sling directly to the load ABOVE the Center of Gravity. The lifting hook must be able to move, or travel, in the direction of the turn to prevent sliding of the pivot edge of the load just as the load leaves the ground. It may be necessary to lift the load clear to reposition it after the turn is completed, and irregular shapes sometimes will require blocking for support during and after the turn.



Two-hook turning is employed when it is desired to turn the load freely in the air. Main and auxiliary hoists of a crane can often be used, or two cranes can be used.

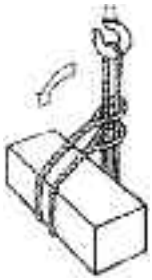


To turn from side (A) to (B) in 1 & 2 above, attach on side (B) above the Center of Gravity and on side (D) at the Center of Gravity, then lift both hoists equally until load is suspended. Lower auxiliary until turn is completed; detach sling at (B) before lowering load completely.

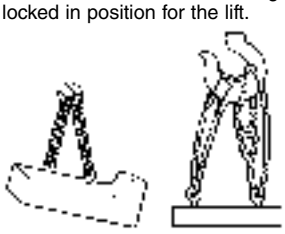


To turn from side (B) to (C) in 3 & 4 above, lift balanced load at (D) directly above the Center of Gravity; then attach auxiliary at (B) and lift to desired position. Lower both hooks simultaneously until side (C) is in desired position.

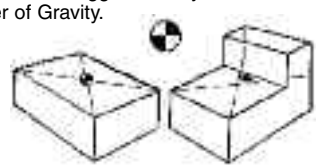
Turning with double choker gives good control, with weight always applied against a tight sling body and no movement between sling and load. To rig, place both eyes on top of load, pointing opposite direction of turn. Body of sling is then passed under load, through both eyes and over lifting hook. Blocking should be used under load to protect sling and facilitate removal.



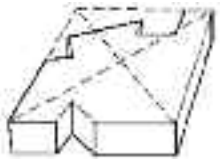
Lifting unbalanced loads when exact length slings are not available can be accomplished by rigging a choke on the heavy end, as right. Length can be adjusted before weight applies, but once the load comes onto the sling, the hitch is locked in position for the lift.



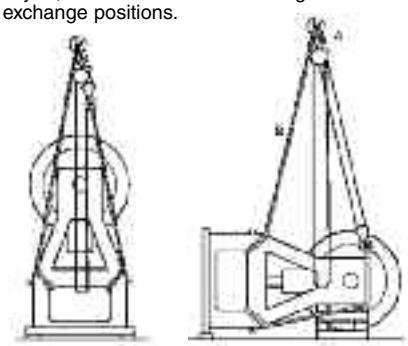
Center of Gravity of a rectangular object with homogenious characteristics will usually be below the junction of lines drawn diagonally from opposite corners. When a rectangular object has weight concentrated at one end, Center of Gravity will be situated toward that end–away from the intersection of diagonal lines. To avoid an unbalanced lift, the lifting hook must be rigged directly above the Center of Gravity.



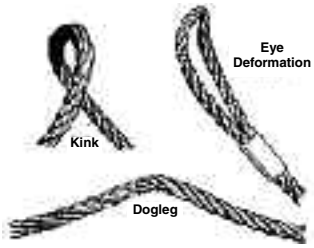
To locate the approximate Center of Gravity of an irregularly shaped article, visualize it enclosed by a rectangle. Where diagonals from opposite corners intersect will usually provide a lift point near the Center of Gravity.



Overturning a heavy object onto cribbing, using one lifting hook and chainblock. To upend the object, chainblock "A" and the sling "B" should exchange positions.



Doglegs, Sets and Kinks



When a loop is "pulled through," it forms a kink which permanently deforms a wire rope by freezing or locking wires and strands. This prevents them from sliding and adjusting, and reduces rope strength.

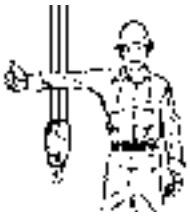
A dogleg is a "set" which occurs when a wire rope sling is pulled down snug against a load. A dogleg usually can be "rolled back" or turned inside out, and usefulness of the sling restored, since strands can still adjust.

Eye deformation is ordinarily not detrimental to sling strength as long as there are no broken wires or gross distortion of the lay of strands. An eye has two legs, so has adequate strength for the load the body can carry. A sling should be retired when distortion locks the strands or flattens the rope in the eye so strands cannot move and adjust.

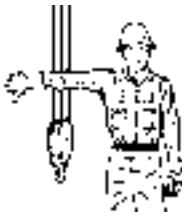
USA Standard Crane Hand Signals

Use Main Hoist. Tap fist on head; then use regular signals.

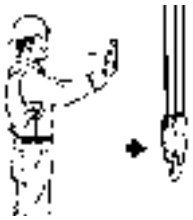
Use Whipline (Auxiliary Hoist). Tap elbow with one hand, then use regular signals.



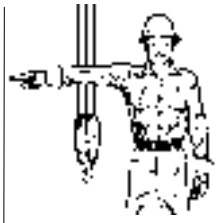
Raise Boom. Arm extended, fingers closed, thumb pointing upward.



Lower Boom. Arm extended, fingers closed, thumb pointing downward.



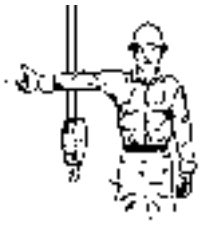
Travel. Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.



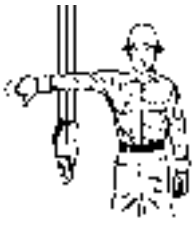
Swing. Am extended, point with finger in direction of swing of boom.

Hoist. With forearm vertical, forefinger pointing up, move hand in small horizontal circle.

Lower. With arm extended downward, forefinger pointing down, move hand in small horizontal circles.



Raise the Boom and Lower the Load. With arm extended thumb pointing up, flex fingers in and out as long as load movement is desired.



Lower the Boom and Raise the Load. With arm extended, thumb pointing down, flex fingers in and out as load movement is desired.

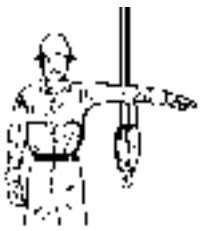
Travel. (One Track). Lock the track on side indicated by raised fist. Travel opposite track in direction indicated by circular motion of other fist, rotated vertically in front of body. (For crawler cranes only).

Travel (Both Tracks). Use both fists in front of body, making a circular motion about each other, indicating direction of travel; forward or backward. (For crawler cranes only.)

Additional Signals for Bridge Cranes

Extend Boom (Telescoping Booms). Both fists in front of body with thumbs pointing outward.

Retract Boom (Telescoping Booms). Both fists in front of body with thumbs pointing toward each other.

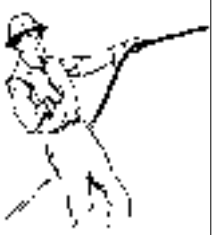


Stop. Arm extended, palm down, hold position rigidly.

Emergency Stop. Arm extended, palm down, move hand rapidly right and left.

Bridge Travel. Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.

Trolley Travel. Palm up, fingers closed, thumb pointing in direction of motion, jerk hand horizontally.

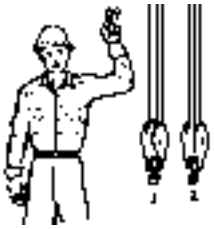


Extend Boom (Telescoping Boom). One Hand Signal. One fist in front of chest with thumb tapping chest.

Retract Boom (Telescoping Boom). One Hand Signal. One fist in front of chest, thumb pointing outward and heel of fist tapping chest.

Move Slowly. Use one hand to give any motion signal and place other hand motionless in front of hand giving the motion signal. (Hoist slowly shown as example.)

Dog Everything. Clasp hands in front of body.

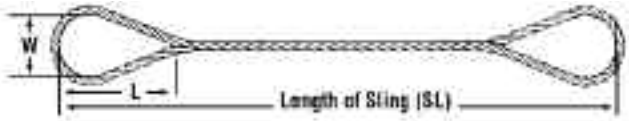


Multiple Trolleys. Hold up one finger for block marked "1" and two fingers for block marked "2". Regular signals follow.

Magnet Is Disconnected. Crane Operator spreads both hands apart palms up.

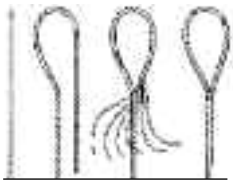
Single-Rope Leg Tucked Splice Loop End Slings
Buffalo Sling™ No. 100B

The end of a single wire rope is bent back along the rope to form the eye, and strands are hand-tucked into the body of the rope in what is called a tapered and concealed splice. This splice makes a sling that is easily pulled through narrow spaces; there are no rough ends to snag hands. Slings with rope bodies larger than 1-1/2" diameter are made only with Burnt End splices in which ends of strands are left exposed and cut off with a torch. These may also be cut shorter and served, for smoothness. All have the same rated capacity, size for size.



Hand Spliced Eye

The tapered and concealed splice utilizes tension in the rope body to secure strands where they are tucked back into the rope. Needs no metal sleeve to assure firm anchoring. When "tapered and concealed," ends of strands are tucked inward and concealed inside the rope.



WARNING: Hand-spliced slings should not be used in lifts where the sling may rotate and cause the wire rope to unlay.

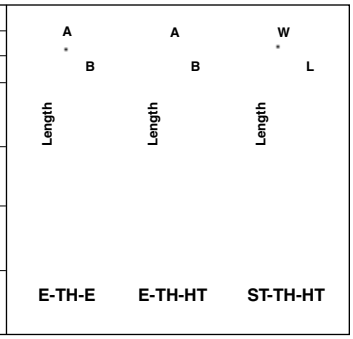
Dia. of Rope (in)	Min. Length (SL) of Sling (ft - in)	Loop Dim. W (in)	Loop Dim. L (in)	Rated Capacities (Tons) IPS Rope - Fiber Core Choker Hitch	IPS Rope - Fiber Core Single Leg Vertical	IPS Rope - Fiber Core Basket Hitch 60°	IPS Rope - Fiber Core Basket Hitch 45°	IPS Rope - Fiber Core Basket Hitch 30°	IPS Rope - IWRC Choker Hitch	IPS Rope - IWRC Single Leg Vertical	IPS Rope - IWRC Basket Hitch 60°	IPS Rope - IWRC Basket Hitch 45°	IPS Rope - IWRC Basket Hitch 30°	EIPS Rope - IWRC Choker Hitch	EIPS Rope - IWRC Single Leg Vertical	EIPS Rope - IWRC Basket Hitch 60°	EIPS Rope - IWRC Basket Hitch 45°	EIPS Rope - IWRC Basket Hitch 30°
3/8	2 - 6	3	6	0.85	1.1	1.9	1.6	1.1	0.92	1.2	2.1	1.7	1.2	1.1	1.3	2.3	1.8	1.3
7/16	2 - 9	3-1/2	7	1.2	1.4	2.4	2.0	1.4	1.2	1.5	2.6	2.1	1.5	1.4	1.8	3.1	2.5	1.8
1/2	3	4	8	1.5	1.8	3.1	2.5	1.8	1.6	2.0	3.5	2.8	2.0	1.9	2.3	4.0	3.3	2.3
9/16	3 - 6	4-1/2	9	1.9	2.3	4.0	3.3	2.3	2.0	2.5	4.3	3.5	2.5	2.4	2.9	5.0	4.1	2.9
5/8	4	5	10	2.3	2.8	4.8	4.0	2.8	2.5	3.0	5.2	4.2	3.0	2.9	3.5	6.1	4.9	3.5
3/4	4 - 6	6	12	3.3	3.9	6.8	5.5	3.9	3.6	4.2	7.3	5.9	4.2	4.1	4.8	8.3	6.8	4.8
7/8	5 - 6	7	14	4.5	5.2	9.0	7.4	5.2	4.8	5.5	9.5	7.8	5.5	5.6	6.4	11	9.0	6.4
1	6	8	16	5.9	6.7	12	9.5	6.7	6.3	7.2	12	10	7.2	7.2	8.3	14	12	8.3
1-1/8	6 - 6	9	18	7.4	8.4	15	12	8.4	7.9	9.0	16	13	9.0	9.1	10	17	14	10
1-1/4	7	10	20	9.0	10	17	14	10	9.7	11	19	16	11	11	13	23	18	13
1-3/8	7 - 6	11	22	11	12	21	17	12	12	13	23	18	13	13	15	26	21	15
1-1/2	8 - 6	12	24	13	15	26	21	15	14	16	28	23	16	16	18	31	25	18
1-5/8	9	13	26	15	17	29	24	17	16	18	31	25	18	18	21	36	30	21
1-3/4	9 - 6	14	28	17	20	35	28	20	19	21	36	30	21	21	24	42	34	24
2	11	16	32	22	26	45	37	26	24	28	48	40	28	28	32	55	45	32
2-1/4	12 - 6	18	36	28	32	55	45	32	30	34	59	48	34	35	40	69	57	40
2-1/2	14	20	40	34	39	68	55	39	37	42	73	59	42	42	48	83	68	48

Rated capacities of choker hitches apply when the angle of choke is greater than 120°

Rated capacities of basket hitches are based on a minimum diameter of curvature at the point of load contact of 25 times the rope diameter.

Single Part Body Hand Spliced Slings

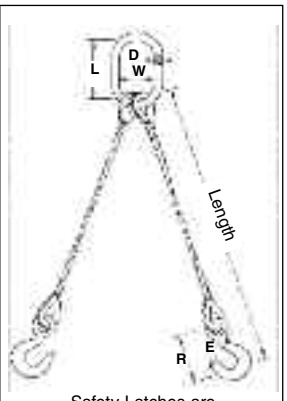
	Rope Dia. (in)	*** Rated Capacity (Tons)*	Eye Dim. (in) A	Eye Dim. (in) B	Slip-Thru Thimble No.	Slip-Thru Thimble Dim. (in) L	Slip-Thru Thimble Dim. (in) W
6x19 FC	1/4	.38	2	4	W-2	4-1/8	2-1/8
	5/16	.60	2-1/2	5	W-2	4-1/8	2-1/8
	3/8	.85	3	6	W-2	4-1/8	2-1/8
	1/2	1.5	4	8	W-3	4-3/8	2-3/8
	5/8	2.3	5	10	W-4	6-5/8	3-3/8
	3/4	3.3	6	12	W4	6-5/8	3-3/8
	7/8	4.5	6-1/2	1 3	W-5	7-1/8	3-3/4
	1	5.9	7	14	W-5	7-1/8	3-3/4
	1-1/8	7.4	7-1/2	15	W-6	8-3/8	4-3/8
6x37 FC	1-1/4	9.	8	16	W-6	8-3/8	4-3/8
	1-3/8	11.	8-1/2	17	W-7	9-1/2	5
	1-1/2	13.	9	18	W-7	9-1/2	5



*Rated Capacities Basket Hitch based on D/d Ratio of 15.

***See Choker Hitch Rated Capacity Adjustment.

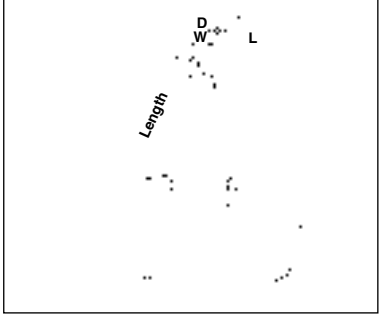
	Rope Dia. (in)	Rated Cap. (Tons)* 60°	Rated Cap. (Tons)* 45°	Rated Cap. (Tons)* 30°	Alloy Oblong Link D	Alloy Oblong Link L	Alloy Oblong Link W	Hook WLL** (Tons)	Hook E	Hook R
6x19 FC	1/4	.85	.70	.49	1/2	5	2-1/2	3-1/4	15/16	3-7/32
	5/16	1.3	1.1	.76	1/2	5	2-1/2	1	1-1/32	3-21/32
	3/8	1.9	1.9	1.1	1/2	5	2-1/2	1-1/2	1-1/16	4 -3/32
	7/16	2.5	2.0	1.4	5/8	6	3	1-1/2	1-1/16	4-3/32
	1/2	3.2	2.6	1.8	3/4	5-1/2	2-3/4	2	1-7/32	4-11/16
	9/16	4.0	3.2	2.3	3/4	5-1/2	2-3/4	3	1-1/2	5-3/4
	5/8	4.9	4.0	2.8	1	8	4	3	1-1/2	5-3/4
	3/4	6.8	5.5	3.9	1	8	4	5	1-7/8	7-3/8
	7/8	8.9	7.3	5.2	1	8	4	7-1/2	2-1/4	9-1/16
	1	12.	9.5	6.7	1-1/4	8-3/4	4-3/8	7-1/2	2-1/4	9-1/16
	1-1/8	15.	12.	8.4	1-1/4	8-3/4	4-3/8	10	2-1/2	10- 1/16
	1-1/4	18.	15.	10.	1-1/2	12	6	10	2-1/2	10-1/16
6x37 FC	1-3/8	22.	18.	12.	1-3/4	12	6	15	3-3/8	12-1/2
	1-1/2	25.	21.	15.	1-3/4	12	6	15	3-3/8	12-1/2
	1-5/8	30.	24.	17.	2	14	7	AH-22	3-3/8	12-1/2
	1-3/4	34.	28.	20.	2	14	7	AH-30	4	14-1/16
	2	44.	36.	26.	2-1/4	16	8	AH-37	4-1/4	18-3/16
	2-1/4	55.	45.	32.	2-1/2	16	8	AH-45	4-3/4	20-1/8



Safety Latches are available if required.

*Rated Capacities Basket Hitch based on D/d Ratio of 15.
Rated Capacities based on pin diameter no larger than natural eye width or less than the nominal sling diameter.
Rated Capacities based on design factor of 5.
Sling angles of less than 30 degrees shall not be used.
**Working Load Limit.

	Rope Dia. (in)	Rated Capacity (Tons)* 2 Leg Alloy Choker Hitch*** 60°	45°	30°	Alloy Oblong Link (in) D	L	W
6x19 FC	1/4	.66	.54	.38	1/2	5	2-1/2
	5/16	1.0	.84	.6	1/2	5	2-1/2
	3/8	1.5	1.2	.85	1/2	5	2-1/2
	7/16	2.0	1.6	1.2	5/8	6	3
	1/2	2.6	2.1	1.5	5/8	6	3
	9/16	3.3	2.7	1.9	3/4	5-1/2	2-3/4
	5/8	4.0	3.3	2.3	3/4	5-1/2	2-3/4
	3/4	5.8	4.7	3.3	1	8	4
	7/8	7.8	6.4	4.5	1	8	4
	1	10.	8.3	5.9	1	8	4
6x37 FC	1-1/8	13.	10.	7.4	1-1/4	8-3/4	4-3/8
	1-1/4	16.	13.	9.	1-1/2	12	6
	1-3/8	19.	15.	11.	1-1/2	12	6
	1-1/2	22.	18.	13.	1-3/4	12	6



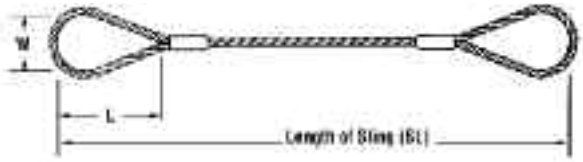
* Rated Capacities Basket Hitch based on D/d Ratio of 15.

*** See Choker Hitch Rated Capacity Adjustment.

Wire Rope Slings

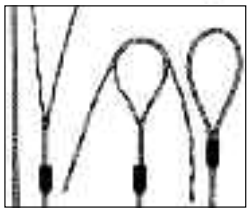
Single-Rope Legs Torpedo Loop-Lock Slings
Buffalo Sling™ No. 105B

Eyes are formed using the flemish eye splice. Ends are secured by pressing a metal sleeve over the ends of the strands of the splice. Pull is directly along the centerline of rope and eye. Gives most efficient use of rope capacity and is economical.



Flemish Eye Splice

In the standard flemish eye mechanical splice, rope is separated into two parts–3 adjacent strands, and 3 adjacent strands and core. These two parts are then re-laid back in opposite directions to form an eye, and ends are secured with a pressed metal sleeve.



Swaging Provides Positive Grip

This cutaway of a metal sleeve swaged onto a splice shows how metal "flows" into valleys between strands to positively prevent ends from unlaying when sling is used within its rated capacity.

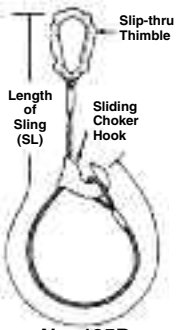
Dia. of Rope (in)	Min. Length (SL) of Sling (ft - in)	Loop Dim. W (in)	Loop Dim. L (in)	Rated Capacities (Tons)* IPS Rope - IWRC Choker Hitch	IPS Rope - IWRC Single Leg Vertical	IPS Rope - IWRC Basket Hitch 60°	IPS Rope - IWRC Basket Hitch 45°	IPS Rope - IWRC Basket Hitch 30°	EIPS Rope - IWRC Choker Hitch	EIPS Rope - IWRC Single Leg Vertical	EIPS Rope - IWRC Basket Hitch 60°	EIPS Rope - IWRC Basket Hitch 45°	EIPS Rope - IWRC Basket Hitch 30°
1/4	1 - 6	2	4	.41	.56	.97	.79	.56	.48	.65	1.1	.92	.65
3/8	2	3	6	.93	1.2	2.1	1.7	1.2	1.1	1.4	2.4	2.0	1.4
1/2	2 - 6	4	8	1.6	2.2	3.8	3.1	2.2	1.9	2.5	4.3	3.5	2.5
5/8	3	5	10	2.5	3.4	5.9	4.8	3.4	2.9	3.9	6.8	5.5	3.9
3/4	3 - 6	6	12	3.6	4.9	8.5	6.9	4.9	4.1	5.6	9.7	7.9	5.6
7/8	4	7	14	4.8	6.6	11	9.3	6.6	5.6	7.6	13	11	7.6
1	4 - 6	8	16	6.3	8.5	15	12	8.5	7.2	9.8	17	14	9.8
1-1/8	5	9	18	7.9	10	17	14	10	9.1	12	21	17	12
1-1/4	5 - 6	10	20	9.7	13	23	18	13	11	15	26	21	15
1-3/8	6	11	22	12	15	26	21	15	13	18	31	25	18
1-1/2	7	12	24	14	18	31	25	18	16	21	36	30	21
1-3/4	8	14	28	19	25	43	35	25	21	28	48	40	28
2	9	16	32	24	32	55	45	32	28	37	64	52	37
2-1/4	10	18	36	30	39	68	55	39	35	44	76	62	44
2-1/2	11	20	40	37	47	81	66	47	42	54	94	76	54
2-3/4	12	22	44	44	57	99	81	57	51	65	113	92	65
3	13	24	48	52	67	116	95	67	60	77	133	109	77
3-1/2	16 - 6	32	64	69	88	152	124	88	79	102	177	144	102
3-3/4	18	36	72	78	100	173	141	100	90	115	199	163	115
4	20	40	80	88	113	196	160	113	101	130	225	184	130
4-1/2	24	50	100	108	139	241	197	139	124	160	277	226	160

* Rated capacities of basket hitches are based on a minimum diameter of curvature at the point of load contact of 40 times the rope diameter for slings 1/4" thru 1" diameter and 25 times the rope diameter for slings 1-1/4" diameter and larger.

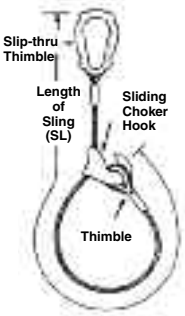
Single-Rope Legs Torpedo Loop-Lock Slings & Choker Hooks

Dia. of Rope (in)	Rated Capacity (Tons)* IPS Rope Fiber Core	IPS Rope IWRC	EIPS Rope IWRC	Slip-Thru Thimbles Size No.	Spliced Loops Width (in)	Spliced Loops Length (in)	Sliding Choker Hooks Size No.	Sliding Choker Hooks Wt. (lbs)
1/4	.38	.42	.48	W-2	2	4	1/4 - 5/16	1.0
3/8	.85	.93	1.1	W-2	3	6	3/8	0.8
1/2	1.5	1.6	1.9	W-3	4	8	1/2	1.25
5/8	2.3	2.5	2.9	W-4	5	10	5/8	2.5
3/4	3.3	3.6	4.2	W-4	6	12	3/4	4.5
7/8	4.5	4.9	5.7	W-5	7	14	7/8 - 1	10
1	5.8	6.4	7.4	W-5	8	16	7/8 - 1	10
1-1/8	7.1	7.8	9.0	W-6	9	18	1-1/8 - 1-1/4	26
1-1/4	8.7	9.6	11	W-6	10	20	1-1/8 - 1-1/4	26
1-3/8	10	11	13	W-7	11	22	1-3/8 - 1-1/2	42
1-1/2	12	14	16	W-7	12	24	1-3/8 - 1-1/2	42

*Rated capacities of Choker hitches apply when the angle of choke is greater than 135°.

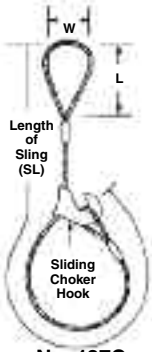


No. 135D

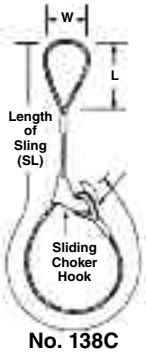


No. 136D

Sling #135 is similar to #136, but has a spliced loop on the load end in place of a thimble.



No. 137C

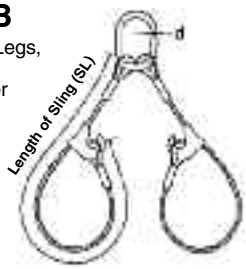


No. 138C

Sling #138 is similar to #137, but has a thimble on the load end in place of a spliced loop.

Two Leg Bridle Slings
No. 210B

Single Rope Legs, Oblong Link, Sliding Choker Hooks and Torpedo Loop-Locks



Dia. of Rope (in)	Rated Capacities* (Tons) IPS Rope IWRC** When Used 60°	45°	30°	Sliding**** Choker Hooks Size (in)	Sliding**** Choker Hooks Wt. (lbs)	Alloy Oblong Links*** d (in)
3/8	1.6	1.3	0.93	3/8	.8	1/2
1/2	2.8	2.3	1.6	1/2	1.25	3/4
5/8	4.4	3.6	2.5	5/8	2.5	7/8
3/4	6.3	5.1	3.6	3/4	4.5	1
7/8	8.5	7.0	4.9	7/8 - 1	8	1-1/8
1	11	9	6.4	7/8 - 1	8	1-1/2
1-1/8	13	11	7.8	1-1/8 - 1-1/4	26	1-1/2
1-1/4	17	14	9.6	1-1/8 - 1-1/4	26	1-3/4
1-3/8	20	16	11	1-3/8 - 1-1/2	42	2
1-1/2	24	19	14	1-3/8 - 1-1/2	42	2

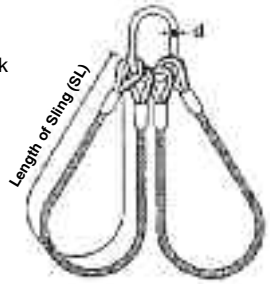
*Rated capacities are based on minimum diameter of curvature at the point of load contact of 20 times the rope diameter.

**Information on EIPS ropes & fitting sizes with higher rated capacities is available on request.

****Rated capacities of choker hitches apply when the angle of choke is greater than 135°.

Two Leg Basket Slings
No. 253C

Two Rope Legs and Oblong Link with Torpedo Loop-Locks



Dia.* of Rope (in)	Rated Capacities** in tons when used 60°	45°	Alloy Oblong Links*** d (in)
3/8	4.3	3.5	1
1/2	7.6	6.2	1-1/2
5/8	12	9.6	1-1/2
3/4	17	14	2
7/8	23	18	2
1	29	24	2-1/4
1-1/8	36	29	2-3/4
1-1/4	44	36	2-3/4
1-3/8	53	44	4
1-1/2	63	52	4
1-3/4	85	69	4
2	110	90	4-3/4

*Larger sizes are available on request.

**Rated capacities are given in tons of 2000 lb. using IPS rope with IWRC. Information on EIPS ropes & fitting sizes with higher rated capacities is available on request. Rated capacities of basket hitches are based on minimum diamter of curvature at the point of loaded contact of 20 times the rope diameter.

Two-Leg Flemished Eye & Mechanically Swaged Slings
No. 200 Series

Dia. of Wire Rope (in)	Min. Length (SL) Of Sling Ft.- In.	Rated Capacities (Tons) IPS-IWRC 60°	45°	30°	Alloy Oblong Links Dia. (in)	Rated Capacities (Tons) EIPS-IWRC 60°	45°	30°
1/4	1 - 3	.97	.79	.56	1/2	1.10	.91	.65
5/16	1 - 6	1.50	1.30	.87	1/2	1.70	1.50	1.00
3/8	1 - 8	2.10	1.80	1.20	3/4	2.50	2.00	1.40
7/16	1 - 10	3.00	2.50	1.70	3/4	3.50	2.80	2.00
1/2	2 - 0	3.80	3.10	2.20	3/4	4.40	3.60	2.50
9/16	2 - 2	4.90	4.00	2.70	1	5.60	4.60	3.10
5/8	2 - 4	5.90	4.80	3.40	1	6.80	5.50	3.90
3/4	2 - 9	8.40	6.90	4.90	1-1/4	9.70	7.90	5.60
7/8	3 - 3	11.00	9.30	6.60	1-1/4	13.00	11.00	7.60
1	3 - 6	15.00	12.00	8.50	1-1/2	17.00	14.00	9.80
1-1/8	4 - 0	18.00	15.00	10.00	1-3/4	21.00	17.00	12.00
1-1/4	4 - 6	22.00	18.00	13.00	1-3/4	26.00	21.00	15.00
1-3/8	5 - 0	27.00	22.00	15.00	2	31.00	25.00	18.00
1-1/2	5 - 6	32.00	26.00	18.00	2-1/4	36.00	30.00	21.00
1-5/8	6 - 0	38.00	31.00	20.00	2-1/2	43.00	35.00	23.00
1-3/4	6 - 6	43.00	35.00	25.00	2-1/2	49.00	40.00	28.00
2	8 - 0	55.00	45.00	32.00	2-3/4	63.00	52.00	37.00
21/4	8 - 9	69.00	56.00	40.00	3-1/4	79.00	65.00	46.00
2-1/2	10 - 0	84.00	68.00	48.00	3-3/4	97.00	79.00	56.00

For approximate capacities using Fibre Core IPS: deduct 10% from IPS-IWRC strengths.

For approximate capacities on Hand Braided Slings: deduct 15% from corresponding mechanically swaged strengths.

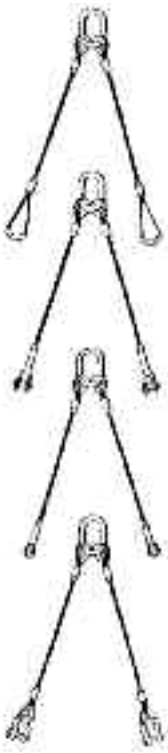
For approximate capacities on Socket Attachments: add 5% to corresponding IWRC swaged strengths.

200 FL
2 leg–Oblong Link with Heavy Duty Thimbles on Top and **Flemish Loops** on Bottom.

200 HT
2 leg–Oblong Link with Heavy Duty Thimbles on Top and **Heavy Duty Thimbles** on Bottom.

200 EH
2 leg–Oblong Link with Heavy Duty Thimbles on Top and **Eye Hoist Hooks** Safety Latches on Bottom.

200 SPA
2 leg–Oblong Link with Heavy Duty Thimbles on Top and **Screw Pin Anchor** Shackle on Bottom.



200 CT
2 leg–Oblong Link with Heavy Duty Thimbles on Top and **Crescent Thimble** on Bottom.

200 OS
2 leg–Oblong Link with Heavy Duty Thimbles on Top and **Open Swage Socket** on Bottom.

200 CS
2 leg–Oblong Link with Heavy Duty Thimbles on Top and **Closed Swage Socket** on Bottom.

200 BAS
2 leg–Oblong Link with Heavy Duty Thimbles on Top and **Bolt Anchor Shackle** on Bottom.

Three-Leg Flemished Eye & Mechanically Swaged Slings
No. 300 Series

Slings are 3-leg All-Purpose bridles, generally recommended for handling unbalanced loads.

Dia. of Wire Rope (in)	Min. Length (SL) Of Sling Ft.- In.	Rated Capacities (Tons) IPS-IWRC 60°	45°	30°	Alloy Oblong Links Dia. (in)	Rated Capacities (Tons) EIPS-IWRC 60°	45°	30°
1/4	1 - 3	1.40	1.20	.84	1/2	1.60	1.40	.97
5/16	1 - 6	2.30	1.80	1.30	3/4	2.60	2.10	1.50
3/8	1 - 8	3.20	2.60	1.90	3/4	3.70	3.00	2.20
7/16	1 - 10	4.40	3.60	2.50	1	5.10	4.10	2.90
1/2	2 - 0	5.70	4.60	3.30	1	6.60	5.30	3.80
9/16	2 - 2	7.10	5.80	4.10	1	8.30	6.80	4.70
5/8	2 - 4	8.80	7.20	5.10	1-1/4	10.00	8.30	5.90
3/4	2 - 9	13.00	10.00	7.30	1-1/2	14.00	12.00	8.40
7/8	3 - 3	17.00	14.00	9.90	1-1/2	20.00	16.00	11.00
1	3 - 6	22.00	18.00	13.00	1-3/4	25.00	21.00	15.00
1-1/8	4 - 0	27.00	22.00	16.00	2	31.00	25.00	18.00
1-1/4	4 - 6	33.00	27.00	18.00	2-1/4	38.00	31.00	21.00
1-3/8	5 - 0	40.00	33.00	22.00	2-3/4	46.00	38.00	25.00
1-1/2	5 - 6	47.00	39.00	26.00	2-3/4	55.00	45.00	30.00
1-5/8	6 - 0	53.00	43.00	31.00	2-3/4	61.00	49.00	36.00
1-3/4	6 - 6	64.00	52.00	35.00	3	73.00	60.00	40.00
2	8 - 0	83.00	67.00	46.00	3-1/2	95.00	76.00	53.00
2-1/4	8 - 9	103.00	84.00	58.00	4	118.00	96.00	67.00
2-1/2	10 - 0	126.00	102.00	72.00	4-1/2	145.00	118.00	84.00

For approximate capacities using Fibre Core IPS: deduct 10% from IPS-IWRC strengths.

For approximate capacities on Hand Braided Slings: deduct 15% from corresponding mechanically swaged strengths.

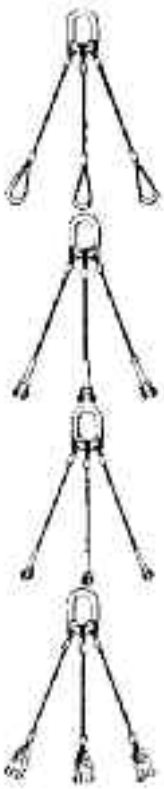
For approximate capacities on Socket Attachments: add 5% to corresponding IWRC swaged strengths.

300 FL
3 leg–Oblong Link with Heavy Duty Thimbles on Top and **Flemish Loops** on Bottom.

300 HT
3 leg–Oblong Link with Heavy Duty Thimbles on Top and **Heavy Duty Thimbles** on Bottom.

300 EH
3 leg–Oblong Link with Heavy Duty Thimbles on Top and **Eye Hoist Hooks** Safety Latches on Bottom.

300 SPA
3 leg–Oblong Link with Heavy Duty Thimbles on Top and **Screw Pin Anchor** Shackle on Bottom.



300 CT
3 leg–Oblong Link with Heavy Duty Thimbles on Top and **Crescent Thimble** on Bottom.

300 OS
3 leg–Oblong Link with Heavy Duty Thimbles on Top and **Open Swage Socket** on Bottom.

300 CS
3 leg–Oblong Link with Heavy Duty Thimbles on Top and **Closed Swage Socket** on Bottom.

300 BAS
3 leg–Oblong Link with Heavy Duty Thimbles on Top and **Bolt Anchor Shackle** on Bottom.

Wire Rope Slings

Four-Leg Flemished Eye & Mechanically Swaged Slings

No. 400 Series

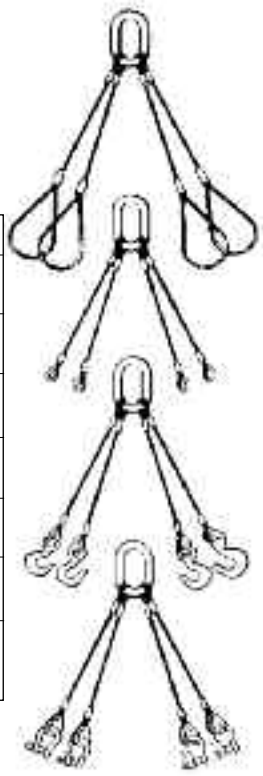
Slings are 4-leg All-Purpose bridles, used both for balanced & unbalanced loads and for heavier loads where design calls for more distribution of weight by the use of attachment at four points.

Dia. of Wire Rope (in)	Min. Length (SL) of Sling Ft.-In.	Rated Capacities (Tons) IPS-IWRC 60°	45°	30°	Alloy Oblong Links Dia. (in)	Rated Capacities (Tons) EIPS-IWRC 60°	45°	30°
1/4	1 - 3	1.90	1.60	1.10	1/2	2.20	1.80	1.30
5/16	1 - 6	3.00	2.50	1.70	3/4	3.50	2.80	2.00
3/8	1 - 8	4.30	3.50	2.40	1	5.00	4.00	2.80
7/16	1- 10	5.80	4.80	3.40	1	6.70	5.50	4.00
1/2	2 - 0	7.60	6.20	4.40	1-1/4	8.70	7.10	5.00
9/16	2 - 2	9.50	7.80	5.40	1-1/4	11.00	9.00	6.20
5/8	2 - 4	12.00	9.60	6.80	1-1/4	13.00	11.00	7.80
3/4	2 - 9	17.00	14.00	9.80	1-3/4	18.00	16.00	11.00
7/8	3 - 3	23.00	18.00	13.00	1-3/4	26.00	21.00	15.00
1	3 - 6	29.00	24.00	17.00	2-1/4	34.00	28.00	20.00
1-1/8	4 - 0	36.00	29.00	20.00	2-3/4	42.00	34.00	24.00
1-1/4	4 - 6	44.00	26.00	26.00	2-3/4	51.00	42.00	30.00
1-3/8	5 - 0	53.00	44.00	30.00	3-1/4	61.00	50.00	36.00
1-1/2	5 - 6	63.00	52.00	36.00	3-3/4	73.00	60.00	42.00
1-5/8	6 - 0	74.00	61.00	40.00	3-3/4	85.00	70.00	46.00
1-3/4	6 - 6	85.00	69.00	50.00	4-1/2	98.00	80.00	56.00
2	8 - 0	110.00	90.00	64.00	4-1/2	126.00	104.00	74.00
2-1/4	8 - 9	138.00	112.00	80.00	Call	158.00	130.00	92.00
2-1/2	10 - 0	168.00	136.00	96.00	Call	194.00	158.00	112.00

For approximate capacities using Fibre Core IPS: deduct 10% from IPS-IWRC strengths.

For approximate capacities on Hand Braided Slings: deduct 15% from corresponding mechanically swaged strengths.

For approximate capacities on Socket Attachments: add 5% to corresponding IWRC swaged strengths.

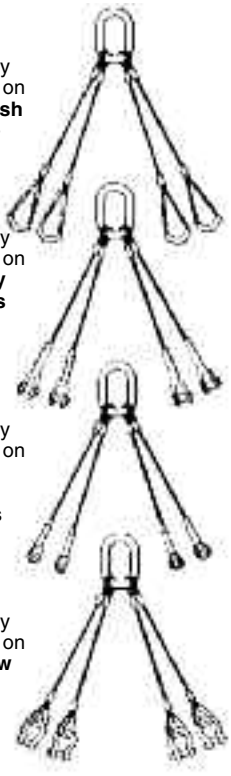


400 FL
4 leg–Oblong Link with Heavy Duty Thimbles on Top and **Flemish Loops** on Bottom.

400 HT
4 leg–Oblong Link with Heavy Duty Thimbles on Top and **Heavy Duty Thimbles** on Bottom.

400 EH
4 leg–Oblong Link with Heavy Duty Thimbles on Top and **Eye Hoist Hooks** Safety Latches on Bottom.

400 SPA
4 leg–Oblong Link with Heavy Duty Thimbles on Top and **Screw Pin Anchor** Shackle on Bottom.



400 CT
4 leg–Oblong Link with Heavy Duty Thimbles on Top and **Crescent Thimble** on Bottom.

400 OS
4 leg–Oblong Link with Heavy Duty Thimbles on Top and **Open Swage Socket** on Bottom.

400 CS
4 leg–Oblong Link with Heavy Duty Thimbles on Top and **Closed Swage Socket** on Bottom.

400 BAS
4 leg–Oblong Link with Heavy Duty Thimbles on Top and **Bolt Anchor Shackle** on Bottom.

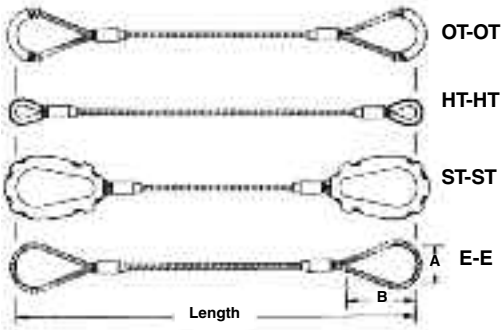
Pertinent Dimensions for End Fittings for No. 200, 300 & 400 Series Slings

Diam. Of Wire Rope (in)	Standard Loop Inside Width (in)	Standard Loop Inside Length (in)	Heavy Duty Thimble Inside Width (in)	Heavy Duty Thimble Inside Length (in)	Alloy Hook Size-Tons IPS & EIPS	Carbon Shackle Size (in) For IPS	Carbon Shackle Size (in) For EIPS	Half Thimble Inside Loop Width (in)	Half Thimble Inside Loop Lenth (in)	Open Swage Socket Pin. Dia. (in)	Open Swage Socket Jaw Opening (in)	Closed Swage Socket Hole. Dia. (in)	Closed Swage Socket Head Thickness (in)
6 x 19 with IWRC													
1/4	2	4	7/8	1-5/8	1	5/16	5/16	–	–	11/16	11/16	3/4	1/2
5/16	2-1/2	5	1-1/16	1-7/8	1	3/8	3/8	–	–	13/16	13/16	7/8	11/16
3/8	3	6	1-1/8	2-1/8	1-1/2	7/16	7/16	2	4	13/16	13/16	7/8	11/16
7/16	3-1/2	7	1-1/4	2-3/8	2	1/2	1/2	2-1/4	5	1	1	1-1/16	7/8
1/2	4	8	1-1/2	2-3/4	3	5/8	5/8	2-1/4	5-1/2	1	1	1-1/16	7/8
9/16	4-1/2	9	1-1/2	2-3/4	5	5/8	5/8	2-1/4	5-1/2	1-3/16	1-1/4	1-1/4	1-1/8
5/8	5	10	1-3/4	3-1/4	5	3/4	3/4	3-1/4	7	1-3/16	1-1/4	1-1/4	1-1/8
3/4	6	12	2	3-3/4	7	7/8	7/8	3-1/4	9	1-3/8	1-1/2	1-7/16	1-5/16
7/8	7	14	2-1/4	4-1/4	11	1	1	4-1/2	10-1/2	1-5/8	1-3/4	1-11/16	1-1/2
1	8	16	2-1/2	4-1/2	11	1-1/8	1-1/4	4-1/2	12	2	2	2-1/16	1-3/4
1-1/8	9	18	2-7/8	5-1/8	15	1-1/4	1-1/4	4-5/8	13-1/2	2-1/4	2-1/4	2-5/16	2
6 x 37 with IWRC													
1-1/4	10	20	2-7/8	5-1/8	15	1-3/8	1-1/2	5-1/2	15	2-1/2	2-1/2	2-9/16	2-1/4
1-3/8	11	22	3-1/2	6-1/4	22	1-1/2	1-3/4	6	17	2-1/2	2-1/2	2-9/16	2-1/4
1-1/2	12	24	3-1/2	6-1/4	22	1-3/4	1-3/4	6-1/2	18	2-3/4	3	2-13/16	2-1/2
1-5/8	13	26	4	8	30	1-3/4	1-3/4	6-1/2	18	3-1/2	3-1/2	3-9/16	3
1-3/4	14	28	4-1/2	9	30	1-3/4	2	7	21-1/2	3-1/2	3-1/2	3-9/16	3
2	16	32	6	12	37	2	2-1/2	7	24-1/2	3-3/4	4	3-13/16	3-1/4
2-1/4	18	36	7	14	45	2-1/2	2-1/2	8-1/2	25-1/2	4-1/4	4-1/4	4-5/16	4
2-1/2	20	40	–	–	60	2-1/2	3	8-1/2	26-1/2	4-1/4	4-1/4	4-5/16	4
2-3/4	22	44	–	–	–	3	3	10	30	–	–	–	–
3	24	48	–	–	–	3	3	10	32	–	–	–	–
3-1/4					–	3	3-1/2						
3-1/2					–	3-1/2	3-1/2						
3-3/4					–	3-1/2	4						
4					–	4	4						

Mechanical Splice Cable Laid Body Wire Rope Slings
Buffalo Sling™ No. 108C

These smooth and very flexible slings are made from cut lengths of cable-laid fabric that is machine formed by laying six wire ropes in a helical pattern around a core rope. Flemish eye mechanical splices, secured by pressed metal sleeves, provide centerline pull at the eyes. More flexible than same capacity single-part slings.

Ideal for use as basket or choker hitches, where flexibility and ease of handling are essential and cutting or abrasion is not a critical factor.

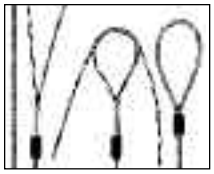


	Body Dia. (in)	Rated Capacity (Tons)* Vert.	*** Choker Hitch	Basket Hitch 60°	45°	30°	Eye A	B	Slip Thru Thimble ST	Heavy Thimble HT	Slip-on Thimble QT
7x7x7	1/4	.50	.34	1.0	.87	.71	.50	2	4	W-2	1/4	3/8
	3/8	1.1	.74	2.2	1.9	1.5	1.1	3	6	W-2	3/8	3/8
	1/2	1.9	1.3	3.7	3.2	2.6	1.9	4	8	W-3	1/2	1/2
	5/8	2.8	1.9	5.5	4.8	3.9	2.8	5	10	W-4	5/8	5/8
	3/4	4.1	2.8	8.1	7.0	5.8	4.1	6	12	W-4	3/4	3/4
	7/8	5.4	3.7	11.	9.4	7.6	5.4	7	14	W-5	7/8	7/8
7x7x19	1	6.9	4.7	14.	12.	9.7	6.9	8	16	W-5	1	1
	1-1/8	8.3	5.8	17.	14.	12.	8.3	9	18	W-6	1-1/8	–
	1-1/4	9.9	7.0	20.	17.	14.	9.9	10	20	W-6	1-1/4	–

* Rated Capacities Basket Hitch based on D/d ratio of 10 or greater.
Rated Cap. based on pin diameter no larger than natural eye width or less than the nominal sling dia.
Rated capacities based on design factor of 5.
Sling angles of less than 30 degrees shall not be used.
*** See *Lift Engineering Guidelines* for Rated Capacity Adjustment for Choker Hitches.

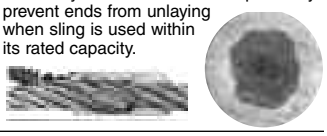
Flemish Eye Splice

In the standard flemish eye mechanical splice, the cable laid fabric is separated into two parts – 3 adjacent component ropes, and the other 3 adjacent component ropes plus the core rope. These two parts are then re-laid back in opposite directions to form an eye, and ends are secured with a pressed metal sleeve.



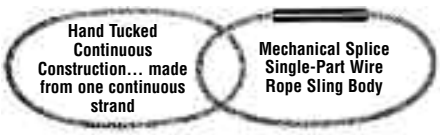
Swaging Provides Positive Grip

This cutaway of a metal sleeve swaged onto a splice shows how metal "flows" into valleys between strands to positively prevent ends from unlaying when sling is used within its rated capacity.



Cable Laid Grommet Wire Rope Slings

Cable Laid Grommets have six wire ropes laid helically around a wire rope core, with ends joined either by a hand tucked or a mechanical splice to form an endless body. Highly flexible, they resist kinks and are easy to handle. Minimum circumference of the sling is 96 times the grommet body diameter.



When a choke is drawn down tight against a load, or a side pull is exerted resulting in an angle of less than 120°, an adjustment must be made for further reduction of the sling rated capacity.

Rated Capacities Basket Hitch and vertical lift based on D/d ratio of 5 when "d" diameter of the finished grommet.

Rated Capacities based on pin diameter no smaller than 5x the body dia.

Rated capacities based on design factor of 5.

Sling angles of less than 30 degrees shall not be used.

*** See Lift Engineering Guidelines for Rated Capacity Adjustment for Choker Hitches.

No. 15B

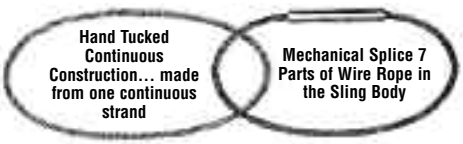
Finished Sling Body Dia.	Rated Capacity (Tons) Vert.	*** Choker	Basket Hitches Vertical	30°	45°	60°
7 x 7 x 19 Construction						
1/4	.83	.54	1.7	.83	1.2	1.4
3/8	1.8	1.2	3.6	1.8	2.5	3.1
1/2	3.0	2.0	6.1	3.0	4.3	5.3
5/8	4.6	3.0	9.1	4.6	6.4	7.9
7 x 6 x 19 and 7 x 6 x 37- EIP Construction						
3/4	6.2	4.1	12	6.2	8.8	11
7/8	8.3	5.4	17	8.3	12	14
1	11	6.8	21	11	15	18
1-1/8	13	8.4	26	13	18	22
1-1/4	16	10	31	16	22	27
1-3/8	18	12	37	18	26	32
1-1/2	22	14	43	22	31	38
1-5/8	25	16	50	25	36	44
1-3/4	28	18	56	28	40	49

No. 21B

EIP Component Rope Dia. (in)	Finished Sling Body Dia. (in)	Rated Capacity (Tons) Vert.	*** Choker	Basket Hitches Vertical	30°	45°	60°
7 x 7 x 7 Galvanized Aircraft Cable							
1/8	3/8	1.6	1.0	3.2	1.6	2.2	2.8
3/16	9/16	3.5	2.3	6.9	3.5	4.9	6.0
7/32	5/8	4.5	2.9	9.0	4.5	6.4	7.8
7 x 6 x 19 and 7 x 6 x 37- EIP							
1/4	3/4	5.6	3.6	11	5.6	7.9	9.7
5/16	15/16	8.7	5.6	17	8.7	12	15
3/8	1-1/8	12	8.0	25	12	17	21
7/16	1-5/16	17	11	33	17	23	29
1/2	1-1/2	21	14	43	21	30	37
9/16	1-11/16	27	17	53	27	38	46
5/8	1-7/8	33	21	66	33	46	57
3/4	2-1/4	46	30	92	46	65	80
7/8	2-5/8	62	40	123	62	87	107
1	3	79	51	158	79	112	137
1-1/8	3-3/8	98	64	196	98	138	170
1-1/4	3-3/4	119	77	237	119	168	205

Strand Laid Grommet Wire Rope Slings

Strand Laid Grommets have either a wire rope body, or a body of six strands laid helically around a strand core, with either a hand tucked or a mechanical splice to form an endless sling body. Minimum circumference of the sling is 96 times the grommet body diameter.



When a choke is drawn down tight against a load, or a side pull is exerted resulting in an angle of less than 120°, an adjustment must be made for further reduction of the sting rated capacity.

Rated Capacities Basket Hitch and vertical lift based on D/d ratio of 5 when "d" diameter of the finished grommet.

Rated Capacities based on pin diameter no smaller than 5x the body dia.

Rated capacities based on design factor of 5.

Sling angles of less than 30 degrees shall not be used.

*** See Lift Engineering Guidelines for Rated Capacity Adjustment for Choker Hitches.

No. 11B

Sling Body Dia. (in)	7x19 and 7x37 Class - IPS – Rated Cap. (Tons) Vert.	*** Choker	Basket Hitches Vertical	60°	45°	30°
1/4	.85	.60	1.7	1.5	1.2	.85
5/16	1.3	.93	2.7	2.3	1.9	1.3
3/8	1.9	1.3	3.8	3.3	2.7	1.9
7/16	2.6	1.8	5.2	4.5	3.6	2.6
1/2	3.3	2.3	6.7	5.8	4.7	3.3
9/16	4.2	2.9	8.4	7.3	6.0	4.2
5/8	5.2	3.6	10.	9.0	7.4	5.2
3/4	7.4	5.2	15.	13.	10.	7.4
7/8	10.	7.0	20.	17.	14.	10.
1	13	9.1	26.	22.	18.	13.
1-1/8	16.	11.	32.	28.	23.	16.
1-1/4	20.	14.	39.	34.	28.	20.
1-3/8	23.	16.	46.	40.	33.	23.
1-1/2	27.	19.	54.	47.	38.	27.
1-5/8	31.	22.	62.	54.	44.	31.
1-3/4	36.	25.	72.	62.	51.	36.
1-7/8	41.	28.	81.	70.	57.	41.
2	46.	32.	92.	79.	65.	46.
2-1/8	51.	36.	102.	88.	72.	51.
2-1/4	56.	39.	113.	98.	80.	56.
2-3/8	62.	44.	124.	108.	88.	62.
2-1/2	68.	47.	136.	117.	96.	68.
2-3/4	81.	56.	161.	140.	114.	81.
3	94.	66.	189.	163.	133.	94.

No. 14B

Sling Body Dia. (in)	6x19 & 6x37 Class - IPS - IWRC – Rated Cap. (Tons) Vert.	*** Choker	Basket Hitches Vertical	60°	45°	30°
1/4	.92	.64	1.8	1.6	1.3	.92
5/16	1.4	1.0	2.9	2.5	2.0	1.4
3/8	2.0	1.4	4.1	3.5	2.9	2.0
7/16	2.8	1.9	5.5	4.8	3.9	2.8
1/2	3.6	2.5	7.2	6.2	5.1	3.6
9/16	4.5	3.2	9.0	7.8	6.4	4.5
5/8	5.6	3.9	11.	9.7	7.9	5.6
3/4	8.	5.6	16.	14.	11.	8.
7/8	11.	7.6	22.	19.	15.	11.
1	14.	9.8	28.	24.	20.	14.
1-1/8	18.	12.	35.	31.	25.	18.
1-1/4	22.	15.	43.	38.	31.	22.
1-3/8	26.	18.	52.	45.	37.	26.
1-1/2	31.	22.	62.	53.	44.	31.
1 -5/8	36.	25.	72.	62.	51.	36.
1-3/4	41.	29.	83.	72.	59.	41.
1-7/8	47.	33.	95.	82.	67.	47.
2	54.	38.	107.	93.	76.	54.
2-1/8	60.	42.	120.	104.	85.	60.
2-1/4	67.	47.	134.	116.	95.	67.
2-3/8	75.	52.	149.	129.	105.	75.
2-1/2	82.	57.	163.	142.	116.	82.
2-3/4	98.	69.	196.	170.	139.	98.
3	115.	81.	231.	200.	163.	115.

Wire Rope Slings

8-Part Braided Slings (Round & Flat)

A Buffalo 8-part braided sling is made from IPS Strand rope, and is available in either round or flat-body construction. Rated capacities are the same for both round-body and flat-body slings. Strengths depend on rope diameters and number of parts. The cross section of a flat-body sling is rectangular; while the cross section of a round-body sling is basically round. Flat-body slings, due to their construction, have wider load-bearing surfaces.

Buffalo 8-part braided slings of round and flat-body constructions are reproduced on these pages to show how the eight parts of a single IPS Strand rope are braided into each sling-body type. Thus, with the eight flexible rope parts in either round or flat-body construction, the resulting sling itself is highly flexible, well-balanced, resistant to kinking, and safe in service. These features also make 8-part braided slings easier to handle, which is particularly advantageous in large diameter sizes.

8-Part Round-Body Specs

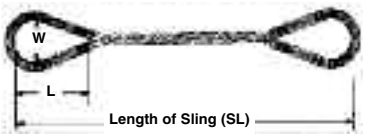
Dia. of Individual Ropes (in)	Approx. Finished Size Body Dia. (in)	Approx. Wt. per ft. (lbs)
1/8	5/8	0.20
3/16	3/4	.47
1/4	1-1/8	.46
5/16	1-3/8	1.4
3/8	1-3/4	2.0
7/16	2	2.7
1/2	2-1/4	3.5
9/16	2-1/2	4.5
5/8	2-7/8	5.5
3/4	3-3/8	8.0
7/8	4	10
1	4-1/2	13
1-1/8	4-3/4	16
1-1/4	6	19
1-3/8	7-1/2	23

8-Part Flat-Body Specs

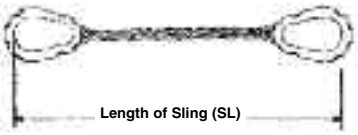
Dia. of Individual Ropes (in)	Approx. Finished Size Width-Thickness (in)	Approx. Wt. per ft. (lbs)
3/32	5/8 - 5/16	0.17
1/8	7/8 - 3/8	.20
3/16	1-1/4 - 9/16	.47
1/4	1-3/4 - 5/8	.86
5/16	1-7/8 - 13/16	1.4
3/8	2-3/8 - 1-1/16	2.0
7/16	2-7/8 - 1-1/4	2.7
1/2	3-1/4 - 1-7/16	3.5
9/16	3-1/4 - 1-5/8	4.5
5/8	4 - 1-3/4	5.5

8-Part Braided Sling Round-Body
8 Ropes of this diameter are braided together in a round construction to form the sling body.

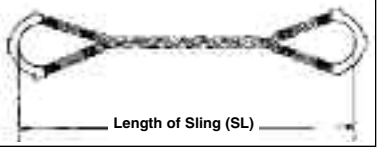
No. 127B (w/served loops)



No. 129B (w/slip-thru thimbles)

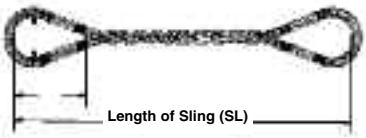


No. 130B (w/arc thimbles)

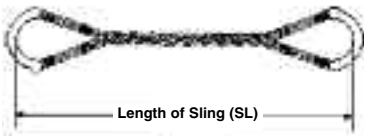


8-Part Braided Sling Flat-Body
8 Ropes of this diameter are braided together in a flat construction to form the sling body.

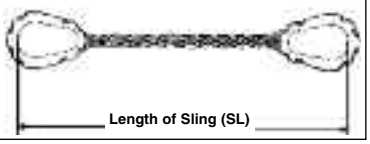
No. 177B (w/served loops)



No. 178B (w/arc thimbles)



No. 179B (w/slip-thru thimbles)



Dia. of Individual Ropes (in)	Min. Length (SL) of Sling ft - in	Rated Capacities (Tons)															Length of Loops	Thimbles	
		IPS–Fiber Core					IPS Rope–IWRC					EIPS Rope–IWRC							
				Basket Hitch					Basket Hitch					Basket Hitch					
		Choker Hitch	Single Leg Vertical	60°	45°	30°	Choker Hitch	Single Leg Vertical	60°	45°	30°	Choker Hitch	Single Leg Vertical	60°	45°	30°	Suggested L (in)	Slip-Thru Thimbles Size No.	Arc Thimbles Size No.
1/8	1 - 6	–	–	–	–	–	–	–	–	–	–	0.83	0.95	1.6	1.3	0.95	6	W-2	8C
3/16	2 - 0	–	–	–	–	–	–	–	–	–	–	1.8	2.1	3.6	3.0	2.1	10	W-3	9C
1/4	2 - 6	–	–	–	–	–	–	–	–	–	–	3.0	3.4	5.9	4.8	3.4	12	W-4	10C
5/16	2 - 9	–	–	–	–	–	–	–	–	–	–	4.5	5.2	9.0	7.4	5.2	16	W-5	14C
3/8	3 - 6	–	–	–	–	–	–	–	–	–	–	6.4	7.3	13	10	7.3	16	W-5	16C
7/16	4 - 0	8.1	9.3	16	13	9.3	8.7	10	17	14	10	10	11	19	16	11	18	W-6	18C
1/2	4 - 6	10	12	21	17	12	11	13	23	18	13	13	15	26	21	15	18	W-7	20C
9/16	5 - 6	13	15	26	21	15	14	16	28	23	16	16	19	33	27	19	24	W-7	22C
5/8	6 - 6	16	19	33	27	19	18	20	35	28	20	20	23	40	33	23	28	W-8	24C
3/4	7 - 6	23	27	47	38	27	25	29	50	41	29	29	33	57	47	33	30	W-9	28C
7/8	8 - 9	32	36	62	51	36	34	39	68	55	39	39	45	78	64	45	36	W-10	32C
1	10 - 6	41	47	81	66	47	44	50	87	71	50	51	58	100	82	58	48	W-10	40C
1-1/8	12 - 6	52	59	102	83	59	55	63	109	89	63	64	73	126	103	73	60	W-11	48C
1-1/4	15 - 0	63	72	125	102	72	68	78	135	110	78	78	89	154	126	89	72	W-11	–
1-3/8	18 - 8	76	87	151	123	87	82	94	163	133	94	94	108	187	153	108	84	–	–

Width (W) of loop is approx. 1/2 the length (L).
Larger sizes can be furnished upon request.
Rated capacities of basket hitches are based on a minimum diameter of curvature at the point of load contact of 20x the component rope diameter.
Rated capacity of choker hitches apply when the angle of choke is greater than 120 degrees.

6-Part Braided Wire Rope Body Single Leg Slings

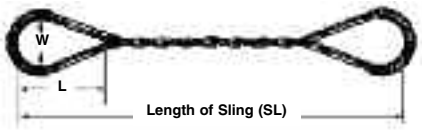
	Rope Dia. (in)	Width of Body (in)	Thickness of Body (in)	Rated Capacity - Tons*						Eye		Slip-Thru Thimble ST^	Heavy Thimble HT
						Basket Hitch							
				Vertical	*** Choker Hitch		60°	45°	30°	A	B		
IPS-IWRC	#3/32	7/16	1/4	.42	.37	.84	.73	.59	.42	2	4	W-2	1/4
	#1/8	9/16	3/8	.84	.74	1.7	1.5	1.2	.84	3	6	W-2	5/16
	3/16	13/16	1/2	1.4	1.2	2.8	2.4	2.0	1.4	4	8	W-3	1/2
	1/4	1-1/8	11/16	2. 5	2.2	4.9	4.3	3.5	2.5	5	10	W-4	5/8
	5/16	1-3/8	7/8	3.8	3.4	7.7	6.7	5.4	3.8	6	12	W-4	3/4
	3/8	1-11/16	1	5.5	4.8	11.	9.5	7.8	5.5	7	14	W-5	7/8
	7/16	2	1-3/16	7.5	6.5	15.	13.	11.	7.5	8	16	W-5	1
	1/2	2-1/4	1-5/16	9.7	8.5	19.	17.	14.	9.7	9	18	W-6	1-1/8
	9/16	2-1/2	1-1/2	12.	11.	24.	21.	17.	12.	10	20	W-6	1-3/8
	5/8	2-13/16	1-11/16	15.	13.	30.	26.	21.	15.	11	22	W-7	1-1/2
	3/4	3-3/8	2	22.	19.	43.	37.	30.	22.	12	24	W-8	1-5/8
	7/8	4	2-5/16	29.	25.	58.	50.	41.	29.	14	28	W-9	2
	1	4-1/2	2-11/16	38.	33.	75.	65.	53.	38.	16	32	W-10	–

No. 167B

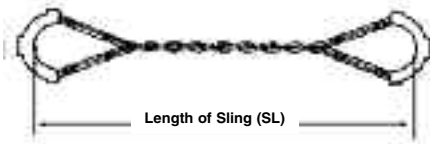
Made with 7 x 19 GAC component rope.
* Rated Capacities Basket Hitch based on D/d ratio of 25 times the Component rope diameter.
Rated Capacities based on pin diameter no larger than natural eye width or less than the nominal sling diameter.
Rated Capacities based on design factor of 5.
Sling angles less than 30 degrees shall not be used.
*** See Choker Hitch Rated Capacity Adjustment.

4-Part Round Body

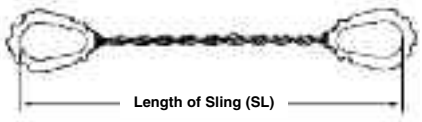
No. 121 B (w/served loops)



No. 122 B (w/arc thimbles)



No. 128 B (w/slip-thru thimbles)



Rated Capacities (Tons)														
Dia. Of Individual Rope in.	Min. Length (SL) of Sling ft - in.	IPS–IWRC					EIPS–IWRC					Length of Loops	Slip-Thru Thimbles	Arc Thimbles
		Choker Hitch	Single Leg Vertical	60°	45°	30°	Choker Hitch	Single Leg Vertical	60°	45°	30°	Suggested L (in)	Size No.	Size No.
1/8	1 - 6	–	–	–	–	–	0.42	0.48	0.83	0.68	0.48	6	W-2	6C
3/16	2 - 0	–	–	–	–	–	0.91	1.0	1.7	1.4	1.0	10	W-2	6C
1/4	2 - 6	–	–	–	–	–	1.5	1.7	2.9	2.4	1.7	12	W-3	8C
5/16	2 - 9	–	–	–	–	–	2.3	2.6	4.5	3.7	2.6	16	W-3	8C
3/8	3 - 6	–	–	–	–	–	3.2	3.7	6.4	5.2	3.7	16	W-4	10C
7/16	4 - 0	4.4	5.0	8.7	7.1	5.0	5.0	5.7	9.9	8.1	5.7	18	W-5	14C
1/2	4 - 6	5.6	6.4	11.0	9.0	6.4	6.5	7.4	13.0	10.0	7.4	18	W-5	16C

Tri-Flex® Sling Engineering

TRI-FLEX® Wire Rope Slings provide the best combination of strength & flexibility. Because of the patented TRI-FLEX® SLING construction, there is a large savings in material & machine costs in the larger sizes; this, combined with ease of use make TRI-FLEX® SLINGS the only sling for smart buyers.

- D/d of 5 for Component Parts of Body In Vert; Basket
- D/d of 3 for Component Parts of Loop

WARNING: Inspect before use. Follow OSHA, ANSI B30.9 or Manufacturers Guidelines. Use by untrained persons Is hazardous. Improper use will result In serious Injury or death. Do not exceed rated capacity. This product will fail if damaged, abused, misused, overused or Improperly maintained.
Patent #4,043,581

SLINGMAX® RIGGING PRODUCTS

CERTIFIED PROOF TESTING: SLINGS - WIRE ROPE - CHAIN - NYLON - FITTINGS

Equiv. to Std. Size Flemish Eye Sling (in)	Composed of 3-Parts of EIP Rope (in)	Rated Capacity (Tons)*			Finished Actual Dia. (in)	Approx. Wt. Per Ft. (lbs)
		Vert.	Choker	Vertical Basket		
7/16	1/4	1.7	1.3	3.4	1/2	.44
9/16	5/16	2.6	1.9	5.2	5/8	.68
5/8	3/8	3.6	2.7	7.2	3/4	.99
3/4	7/16	4.9	3.7	9.8	7/8	1.33
7/8	1/2	6.4	4.8	12.8	1	1.75
1	9/16	8.0	6.0	16.0	1-1/8	2.24
1-1/8	5/8	9.9	7.4	19.8	1-1/4	2.73
1-1/4	3/4	14.0	10.5	28.0	1-1/2	3.9
1-1/2	7/8	19.0	14.3	38.0	1-3/4	5.4
1-3/4	1	24.8	18.6	49.6	2	7.0
2	1-1/8	31.2	23.4	62.4	2-1/4	8.9
2-1/4	1-1/4	38.4	28.8	76.8	2-1/2	10.0
2-1/2	1-3/8	46.0	34.5	92.0	2-3/4	13.3
2-3/4	1-1/2	55.0	41.2	110.0	3	15.8
3	1-5/8	63.4	47.6	126.8	3-1/4	18.5
3-1/4	1-3/4	73.0	54.8	146.0	3-1/2	21.5
3-1/2	2	95.0	71.2	190.0	4	28.0
4	2-1/4	118.0	88.5	236.0	4-1/2	35.6
4-1/2	2-1/2	145.0	109.0	290.0	5	44.0

* Rated Load with 5-1 Factor

Tri-Flex® Sling Engineering System

The TRI-FLEX® SYSTEM allows the purchase of multiple part slings for big lifts which can easily be taken apart to provide slings for smaller lifts or for storage.

1 TRI-FLEX® SLING = 3 part EIP Rope
A complete sling with 3 parts for flexibility.

3 TRI-FLEX® SLINGS = 9 parts EIP Rope.
These break down into three 3-part standard Tri-Flex® Slings.

9 TRI-FLEX® SLINGS = 27 parts EIP Rope.
These break down into three 9-part slings or nine 3-part slings.

WARNING: Inspect before use. Follow OSHA, ANSI B30.9 or Manufacturers Guidelines. Use by untrained persons Is hazardous. Improper use will result In serious Injury or death . Do not exceed rated capacity. This product will fail If damaged, abused, misused, overused or Improperly maintained. US Patent #4,240,659 - British Patent #2,029,796 - Canadian Patent #1,082,755

SLINGMAX® RIGGING PRODUCTS

CERTIFIED PROOF TESTING: SLINGS - WIRE ROPE - CHAIN - NYLON - FITTINGS

Dia. of Individual Parts (in)	1 Tri-Flex® Sling		3 Tri-Flex® Sling		9 Tri-Flex® Sling	
	Vertical Rated Load (tons)*	Finished Dia. (in)	Vertical Rated Load (tons)*	Finished Dia. (in)	Vertical Rated Load (tons)*	Finished Dia. (in)
1/4	1.7	1/2	4.6	1	12.9	2
5/16	2.6	5/8	7.0	1-1/4	19.9	2-1/2
3/8	3.6	3/4	10.0	1-1/2	28.5	3
7/16	4.9	7/8	13.8	1-3/4	38.6	3-1/2
1/2	6.4	1	18.0	2	50.0	4
9/16	8.0	1-1/8	22.7	2-1/4	63.5	4-1/2
5/8	9.9	1-1/4	27.8	2-1/2	78.0	5
3/4	14.0	1-1/2	39.7	3	110.0	6
7/8	19.0	1-3/4	53.7	3-1/2	150.0	7
1	24.8	2	69.8	4	195.0	8
1-1/8	31.2	2-1/4	87.7	4-1/2	245.0	9
1-1/4	38.4	2-1/2	108.0	5	302.0	10
1-3/8	46.0	2-3/4	130.0	5-1/2	363.0	11
1-1/2	55.0	3	154.0	6	430.0	12
1-5/8	63.4	3-1/4	178.0	6-1/2	499.0	13
1-3/4	73.0	3-1/2	206.0	7	578.0	14
2	95.0	4	267.0	8	748.0	16
2-1/4	118.0	4-1/2	333.0	9	934.0	18
2-1/2	145.0	5	408.0	10	1140.0	20

*Rated Load with 5-1 Factor

Wire Rope Slings

Gator-Flex® Slings and T & D Ultra-Flex Slings

Gator-Flex®: 9 Parts of Wire Rope Hand Spliced

Large Gator-Flex® slings are used in vertical, basket or inverted basket hitches to lift large components with mobile, tower or offshore cranes.

T & D Ultra-Flex: 9 Parts of Wire Rope with Sleeve

This sling has it all. Easy to handle, easy to store and comes with only one small sleeve per loop.

SLINGMAX® RIGGING PRODUCTS

Finished Dia. (in)	Std. Eye Size (in)	Rated Capacity (Tons)*			Wt. Per Ft.
		Vertical	Choker	Basket	
1/2	8	1.5	1.1	3.0	.26
5/8	10	2.0	1.4	4.0	.40
3/4	12	3.0	2.1	6.0	.59
7/8	14	4.0	2.8	8.0	.77
1	16	5.0	3.5	10.0	.99
1-1/4	18	7.0	4.9	14.0	1.56
1-1/2	20	10.0	7.0	20.0	2.19
1-3/4	22	16.0	11.2	32.0	3.15
2	24	20.0	14.0	40.0	4.14
2-1/4	26	26.0	18.2	52.0	5.31
2-1/2	28	32.0	22.4	64.0	6.48
3	30	45.0	31.5	90.0	9.36
3-1/2	35	61.0	42.7	122.0	12.78
4	40	79.0	55.3	158.0	16.65
4-1/2	45	100.0	70.0	200.0	21.06
5	50	122.0	85.4	244.0	26.01
5-1/2	55	147.0	102.9	294.0	31.50
6	60	174.0	121.8	348.0	37.44
7	70	234.0	163.8	468.0	51.03
8	80	303.0	212.1	606.0	66.51
9	90	378.0	264.6	756.0	84.24
10	100	462.0	323.4	924.0	104.00

*Rated capacity is based on 5-1 Design Factor.

WARNING: Inspect before use. Follow OSHA, ANSI B30.9 or Manufacturers Guidelines. Use by untrained persons Is hazardous. Improper use will result In serious Injury or death. Do not exceed rated capacity. This product will fall If damaged, abused, misused, overused or improperly maintained. US Patent #5,561,973

Gator-Flex® Grommets

Slingmax® Heavy Lift Grommets with Tell-Tail Tucks!

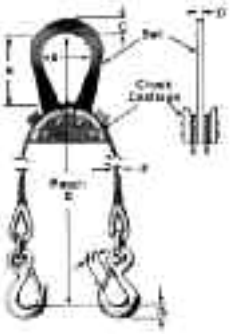
Gator-Flex® Grommets (D/d=5/1)

The Most Flexible Grommet in the World!

Pin Size-5 x FD Finished Dia.(in)	9-Parts Wire Rope Size (in)	Rated Capacity (Tons)*			Wt. Per Foot (lbs.)
		Vertical	Choker	Basket Vertical	
1	1/4	10	7	20	2
1-1/4	5/16	15	11	30	3
1-1/2	3/8	22	15	44	5
1-3/4	7/16	29	21	58	6
2	1/2	38	27	76	8
2-1/4	9/16	48	34	96	11
2-1/2	5/8	59	42	118	13
3	3/4	85	59	170	19
3-1/2	7/8	115	81	230	25
4	1	148	104	296	33
4-1/2	1-1/8	187	131	374	42
5	1-1/4	230	161	460	52
5-1/2	1-3/8	276	194	552	63
6	1-1/2	328	230	656	75
7	1-3/4	441	308	882	102
8	2	570	399	1140	133
9	2-1/4	711	498	1422	168
10	2-1/2	870	609	1740	209
11	2-3/4	1040	728	2080	250
12	3	1224	857	2448	300

*Rated capacity is based on 5-1 Design Factor.

Model 52 Adjust-A-Leg® Two Point Lift

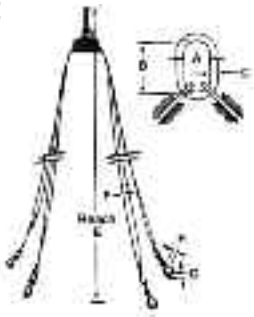


Order Code	Rated Cap. (Tons)*	E Std. Reach Ft - in	F Rope Size (in)	Top Assembly Dim. (in)				Alloy Steel Hooks Dim. w/Safety Latches			Anchor Shackle (in)	Wt. (lbs)
				A	B	C	D	Size (Tons)	H (in)	G (in)		
52-3/4	3/4	2 - 6	1/4 S*	2-3/8	3-1/8	1	3/8	1	1	3/4	3/8	7
52-1	1	3 - 0	5/16 S	2-3/8	3-1/8	1	3/8	1	1	3/4	3/8	7-1/2
52-2	2	4 - 0	5/16 D**	3-1/8	5	1-1/8	5/8	1-1/2	1-1/16	27/32	1/2	20
52-4	4	6 - 0	7/16 D	4-1/2	7-1/4	1-1/2	5/8	3	1-1/4	1-1/8	5/8	32
52-6	6	9 - 0	9/16 D	5-1/4	8-3/8	1-3/4	13/16	4-1/2	1-1/2	1-3/8	3/4	76
52-8	8	9 - 0	5/8 D	5-1/4	8-3/8	1-3/4	7/8	7	1-7/8	1-11/16	7/8	90
52-12	12	9 - 0	3/4 D	5-5/8	8-3/4	2-3/8	1-1/16	11	2-1/4	2-1/8	1-1/8	152
52-15	15	9 - 0	7/8 D	5-5/8	8-3/4	2-3/8	1-1/16	11	2-1/4	2-1/8	1-1/4	175
52-15L	15	9 - 0	7/8 D	9	15	2-1/2	1-1/16	11	2-1/4	2-1/8	1-1/4	188
52-22	22	9 - 0	1-1/8 D	9	15	3-1/2	1-1/2	No Hooks Furnished			1-1/2	350
52-28	28	9 - 0	1-1/4 D	9	15	3-1/2	1-3/4	No Hooks Furnished			1-3/4	385
52-36	36	9 - 0	1-1/2 D	9	15	3-1/2	2	No Hooks Furnished			2	450
52-50	50	9 - 0	1-3/4 D	9	15	3-1/2	2-1/4	No Hooks Furnished			2	525
52-62	62	12 - 0	2 D	9	15	6-1/4	3	No Hooks Furnished			2-1/2	1200
52-75	75	15 - 0	2-1/4 D	9	15	6-1/4	4	No Hooks Furnished			3	1500

*Rated Capacity with legs @ 45° off horizontal. / Reach calculation–approx. 70% distance between pick up points.

Model 54 Adjust-A-Leg® Four Point Lift

Note: Adjust-A-Leg may be used in conjuncion with spreader beams.



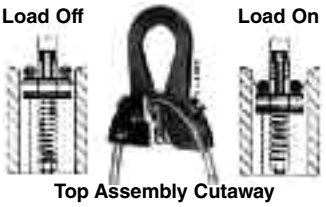
Model No.	Rated Cap.* (Tons)	E Std. Reach (ft)	F Rope Size (in)	Top Assembly Dim. (in)			Alloy Steel Hooks Dim. w/Safety Latches			Anchor Shackle (in)	Wt. (lbs)
				A	B	C	Size (Tons)	H (in)	G (in)		
54-2	2	4	5/16 S	3	6	5/8	1-1/2	1-1/16	27/32	1/2	18
54-4	4	6	5/16 D	3-1/2	7	1	1-1/2	1-1/16	27/32	5/8	45
54-8	8	9	7/16 D	3-1/2	7	1	4-1/2	1-1/2	1-3/8	7/8	70
54-12	12	9	9/16 D	4-3/8	8-3/4	1-1/4	7	1-7/8	1-11/16	1-1/8	170
54-16	16	9	5/8 D	5-1/2	10-1/2	1-1/2	7	1-7/8	1-11/16	1-1/8	210
54-24	24	9	3/4 D	6	12	1-3/4	11	2-1/4	2-1/8	1-1/4	345
54-30	30	9	7/8 D	7	14	2	No Hooks Furnished			1-1/4	410
54-44	44	9	1-1/8 D	7	14	2	No Hooks Furnished			1-3/4	770
54-56	56	9	1-1/4 D	8	16	2-1/2	No Hooks Furnished			1-3/4	850
54-72	72	12	1-1/2 D	9-1/2	16	2-3/4	No Hooks Furnished			2	980
54-100	100	15	1-3/4 D	10	20	3-1/4	No Hooks Furnished			2	1180
54-150	150	20	2-1/4 D	14	22	4-1/2	No Hooks Furnished			3	3600

*Rated Capacity with legs @ 45° off horizontal.

Top assembly design provides positive frictional lock

1. **Load Off:** Spring supported rollers hold wire rope free of V-grooves formed by cheek castings and center bail, permitting free movement of top assembly with respect to wire ropes.
2. **Load On:** Weight of load overcomes roller spring, forcing wire ropes into V-grooves, frictionally locking or breaking the wire ropes from motion.

Note: When in position shown, U-locks retain wire ropes in assembly and permits free movement for leg adjustment. For lifting applications where fixed leg lengths are desired, U-locks are repositioned so that the U-lock tips wedge ropes into V-grooves.



Top Assembly Cutaway