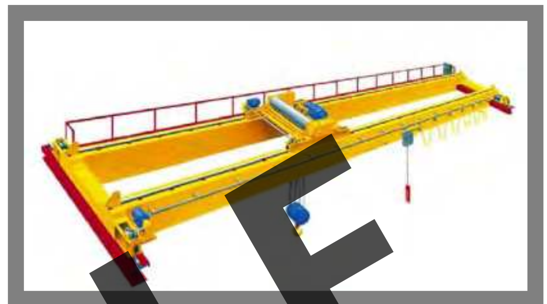
INTRODUCTION

Overhead cranes are used in many industries to move heavy and oversized objects that other material handling methods cannot. These cranes have a railed support structure called a bridge, and a wheeled trolley that travels across the bridge horizontally. Several varieties of overhead cranes exist including gantry, semi-gantry, cantilever gantry, storage bridge and wall cranes.

Floor Mounted Jib



Bridge Crane

Monorail Crane

Wall Mounted Jib

Applicable standards:

- **29 CFR 1910.179** Overhead cranes and gantries
- **29 CFR 1926.554** Overhead hoists
- **ASME B30.2** Overhead and gantry cranes (Top running bridge, single or multiple girder, toprunning trolley hoist)
- **ASME B30.11** Monorails and underhung cranes
- **ASME B30.16** Overhead hoists (underhung)
- **ASME B30.17** Overhead and gantry cranes (Top running bridge, single girder, underhung hoist)

INTRODUCTION

BEING A PROFESSIONAL:

- **ATTITUDE**

- **TEAM MEMBER**

A professional crane operator:

- **Is responsible.**
- **Is on time.**
- **Is rested, alert and physically prepared**
- **Is knowledgeable about safe operating procedures and company rules.**
- **Wears protective clothing and equipment.**
- **Never stops learning about his profession.**
- **Is a skilled operator and continues to improve upon those skills.**
- **Keeps the vehicle under control at all times.**

NEVER RUSHES A JOB

Captain E. J. Smith - 1907

“When anyone asks me how I can best describe my experience of nearly forty years at sea, I merely say uneventful….(I)n all my experience I have never been in any accident of any sort worth speaking about. I have seen but one vessel in distress in all my years at sea…I never saw a wreck and never have been wrecked, nor was I ever in any predicament that threatened to end in disaster of any sort.”

Captain Smith became the captain of the Titanic in 1912

INSPECTING THE CRANE

FREQUENT: **Frequent inspections are visual inspections and examinations by the operator or other designated personnel. Records are not required. Inspection intervals are:**

- **Daily to monthly**

PERIODIC: **Periodic inspections are visual and audio inspections and examinations by designated personnel making records of external conditions to provide the basis for continuing evaluation.**

- **1 to 12 month intervals**

Due to the large and heavy objects often being transported by overhead cranes, routine inspections are necessary to ensure continued operation of the crane and the safety of the employees around the crane. An initial inspection of the crane prior to initial use of new and altered cranes is necessary. Once placed into service, overhead cranes will require two different types of inspections. **Frequent** inspections are done at daily to monthly intervals, while **periodic** inspections are completed at monthly to annual intervals. The purpose of the two inspection types is to detect critical components of the crane and to determine the extent of wear, deterioration or malfunction.

DEFINITION OF SERVICE:

Normal Service: **Involves operations of the crane with randomly distributed load within the rated load limit or uniform loads of less than 65% or rated load limit for no more than 25% of the time for a normal work shift.**

Heavy Service: **Involves operation of the crane within the rated load limit that exceeds normal service.**

Severe Service: **Involves operation of the crane in normal or heavy service with abnormal operating conditions.**

INSPECTING THE CRANE

This is a sample of the inspection booklet found on your CD. You can print one out for every crane. There are two versions, this one, and one that has check boxes at the bottom of the page for the operator to initial that he has performed a pre-shift inspection.

Pre-shift inspections do not have to be lengthy. You are basically looking for obvious things that might be wrong with the crane.

Monthly or yearly inspections, of course, should be thorough and performed by a competent individual.

MONTH ____________________

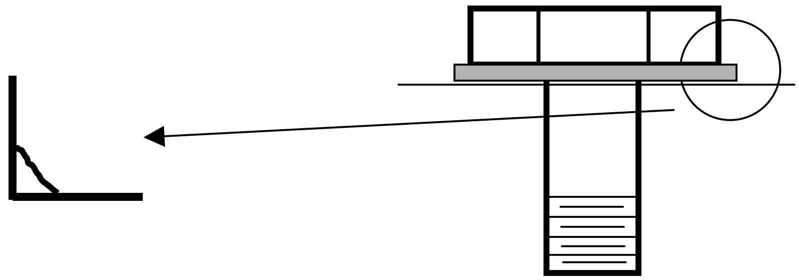
Date Completed:_________ Inspected by: ______________

INSPECTION AREA	INSPECTION RESULTS			
	Sat.	Unsat.	N/A	Comments
Supporting Structure				
Welds				
Bolts				
Bridge				
Rails & Alignment				
Trucks & Wheels				
Motor & Drive Train				
Brakes				
Stops & Limit Controls				
Trolley				
Wheels				
Motor & Drive Train				
Brakes				
Stops & Limit Controls				
Rails & Alignment				
Hoist				
Wire Rope Condition				
Rope Reeving				
Chain Condition				
Brakes & Ratchets				
Equalizer Sheaves				
Hoist Limit Control				
Functional Operation				
Electrical				
Control Markings				
Control Functions				
Warning Alarms				
Power Disconnect				
Control Pendants				
Festoons				
Load Block				
Sheaves				
Pins				
Swivel				
Hook				

LOAD TESTING:

Overhead cranes must be load tested to 110% of capacity when initially put into service and after the crane has been repaired or re-rated.

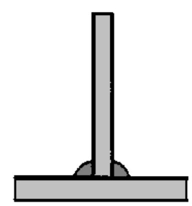
INSPECTING THE CRANE

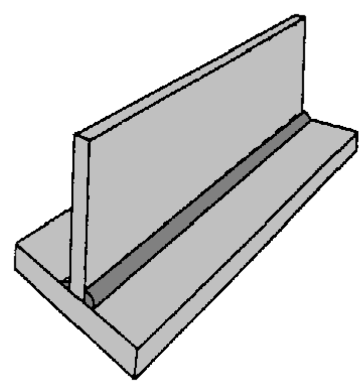


LOOSE FASTENERS

- Check all fasteners for loose, stretched, missing, or broken fasteners.
- A good clue is checking for cracked paint around the fastener that shows there has been movement.
- Sometimes a build up of dirt or grease can do the same thing.
- Using a torque wrench to check for tightness does not always work. Corrosion could give you a false reading.
- Replace a loose or stretched bolt rather than tighten it. It probably has been damaged.
- Be sure to replace the bolt with a grade 8 or better.
- If there are other bolts near by that show signs of looseness, then replace them all.

CRACKED WELDS



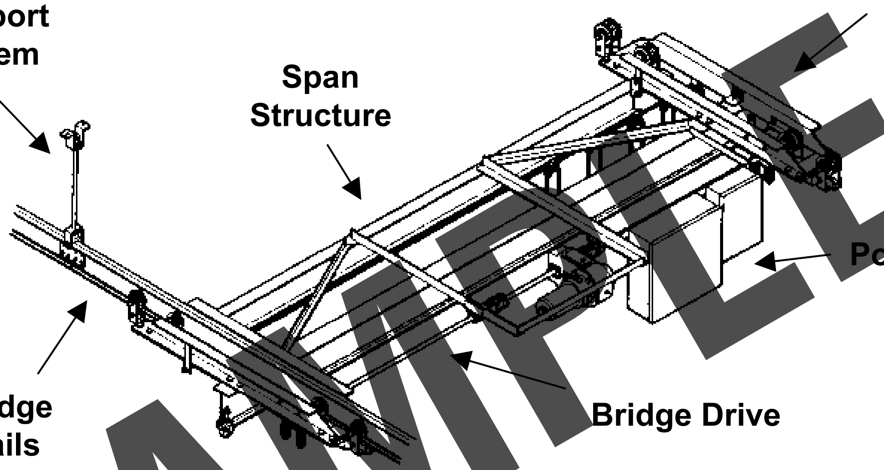


- Check cracks in the structure and in all welds.
- A crack in a weld will always start on the end and work itself along the entire weld until it fails completely.
- Many times a crack in the paint will be a clue to a weld that is failing.
- If caught early, the crack many times can be ground out and re-weld.
- Before welding on any part of the crane, make sure you have a certified welder and if it is on a structural part of the crane you should get the manufactures procedure.
- Also, try to determine why it cracked in the first place. Is the crane being overloaded or used improperly.

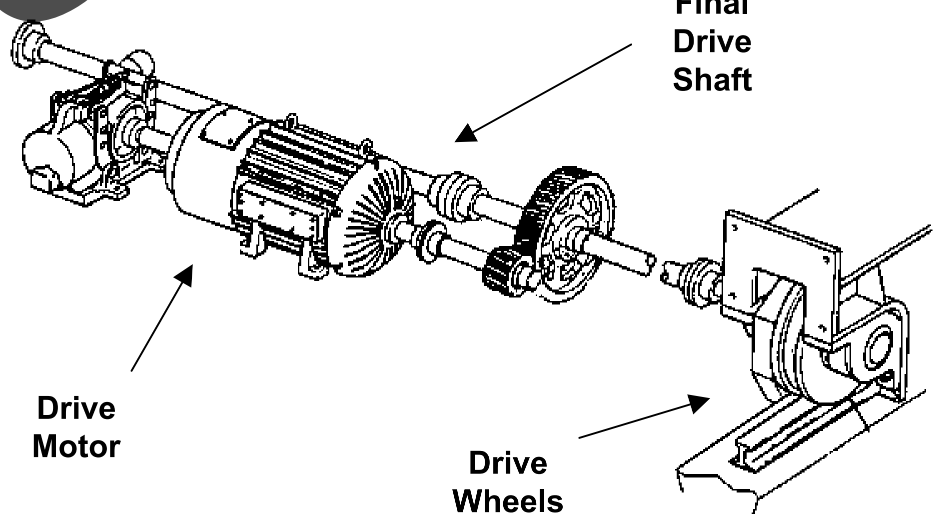
INSPECTING THE CRANE

Climbing up a and checking the bridge system is normally not part of the daily inspection. Many of these components can be inspected from the ground as the crane is being operated. If something seems wrong, then a closer look would be warranted.

BRIDGE CRANE SYSTEM COMPONANTS



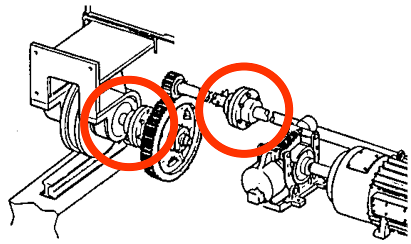
BRIDGE TRUCK DRIVE COMPONANTS

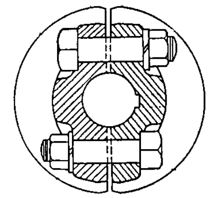


INSPECTING THE CRANE

COUPLINGS

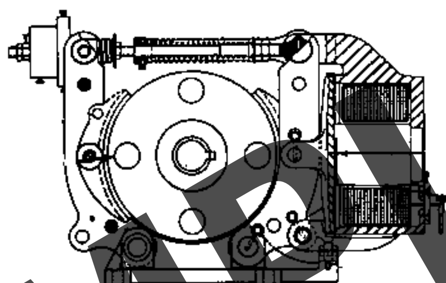
Check Couplings for:
- Loose bolts
- Loose or missing keys
- Cracks





BRAKES

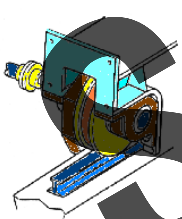
Brake Drum

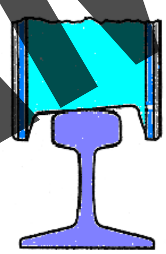


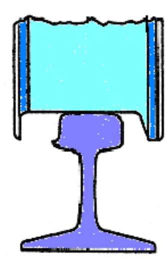
Brake Shoes

Brake Solenoid

WHEEL ALIGNMENT FOR BRIDGE CRANES

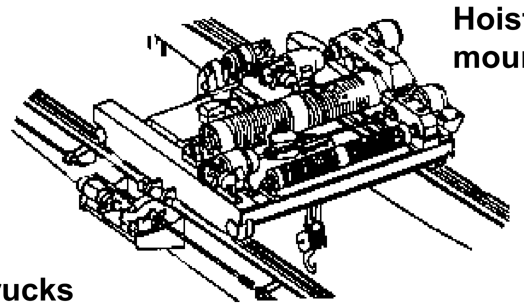






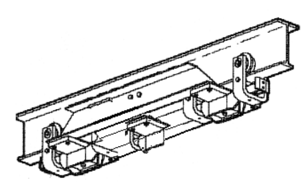
TROLLEY

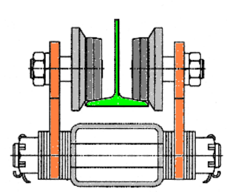
Hoist Machinery mounted on trolley



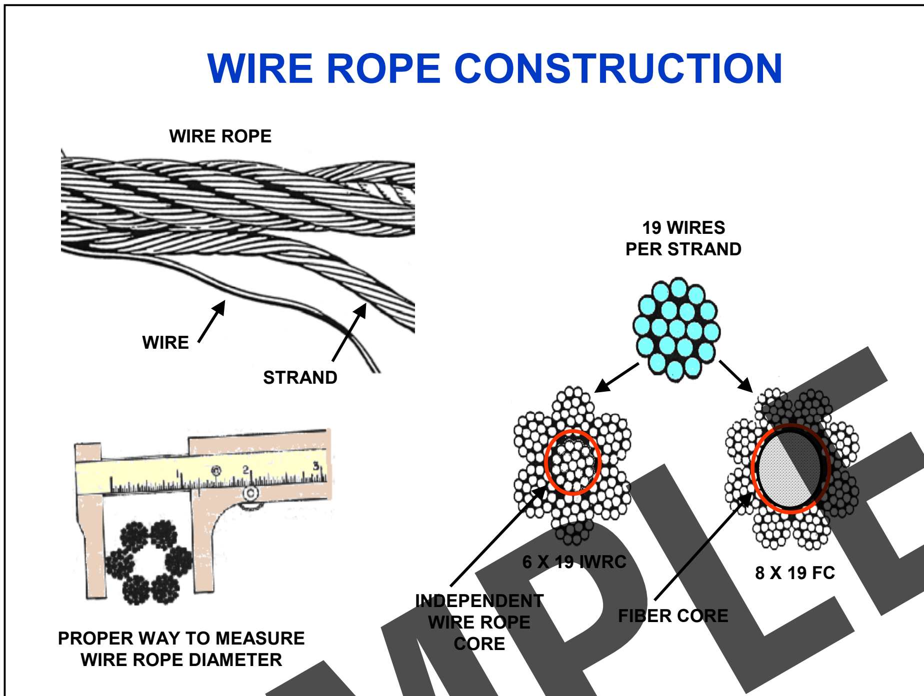
Trolley Trucks

MONORAIL





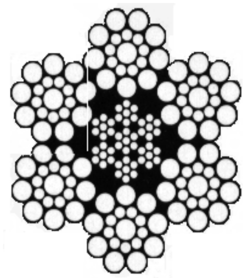
WIRE ROPE



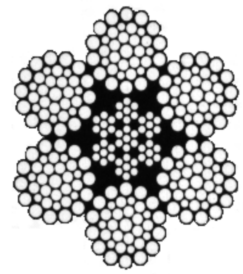
Wire rope is made of steel **wires** laid together to form a **strand.** These strands are laid together to form a rope, usually around a central core of either fiber or wire, as indicated above. **IWRC** is the abbreviation for **independent wire rope core.** This wire core, which is actually another strand, has several advantages over fiber core. It adds about 7 ½% in strength and helps to resist rope crushing.
Fiber core is impregnated with lubricant which is released during use. Fiber core also helps to cushion the strands during use. **Fiber core wire rope should not be used For hoisting or rigging.**
Most wire rope is made from preformed strands. The preforming gives the the stands a better load distribution, and it prevents unraveling when the rope is cut.
The number of strands, number of wires per strand, type of material and nature of the core will depend on the intended purpose of the wire rope.
Wire Rope Lays:
The lay refers to the direction of the winding of the wires in the strands and to the strands in the rope. This term refers to two basic lays. **Regular Lay** and **Lang Lay.**
Regular Lay: The wires in the strands are laid in one direction while the strands in the rope are laid in the opposite direction. The wires are able to withstand considerable crushing and distortion due to the short length of the exposed wires.
Lang Lay: The wires in the strands and the strands in the rope are laid in the same direction. Lang Lay rope should not be used for single part hoisting due to its tendency to untwist. Its biggest advantage is its resistance to abrasion.

WIRE ROPE

Wire rope, with many smaller wires and strands, is **more flexible** than rope with large diameter wires and fewer strands.



ABRASION RESISTANCE
Increases with larger wires
Decreases with smaller wires



FATIGUE RESISTANCE
Decreases with fewer wires
Increases with more wires

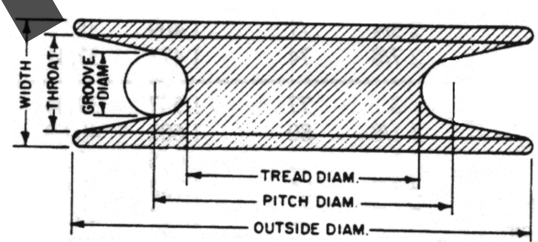
Any time a wire rope goes over a sheave it bends, which causes fatigue in the rope. The more wires the rope has, the more flexible it becomes and less fatigue occurs. The larger the sheave, the less the rope has to bend. The diameter of the sheave must be considered in relation to the type of rope needed for the job.

STANDARDS FOR SHEAVE & DRUM RATIOS

D = Diameter of drum or pitch diameter of the sheave.
d = Diameter of wire rope
ratio = **D / d**

ASNE/B30.5 "MOBILE CRANES"
Minimum Ratios

	Drum	*Sheave*
Load Hoist	**18**	**18**
Boom Hoist	**15**	**15**
Load Block		**16**



The larger the sheave is in diameter as compared to the wire rope, the less bending the rope has to do to go over it.

LESS BENDING MEANS LONGER LIFE

Manufactures of wire rope have even more stringent standards. Here is what one manufacturer recommends for some types of wire rope:

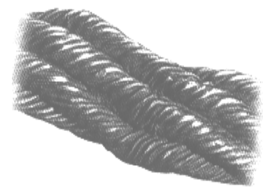
Type max min

6 x 7.......72:1.........42:1
19 x 7.....51:1.........34:1
6 x 19.....51:1.........34:1
6 x 25.....45:1.........30:1

WIRE ROPE INSPECTION

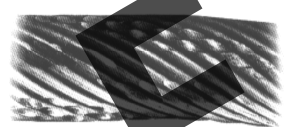
Kinks are a permanent distortion. After a wire rope is kinked it is impossible to straighten the rope enough to return it to its original strength. The rope must be replaced. Causes: crossed lines on drum, improper handling and installation, and uncoiling.

KINKED WIRE ROPE

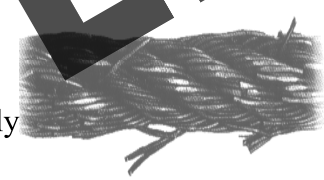


Strand Nicking is due to continued operation under a high load which results in core failure.

STRAND NICKING

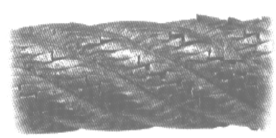


FATIGUE FAILURE

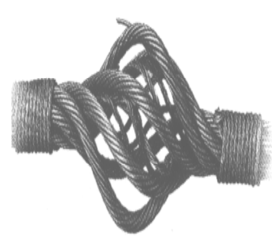


Metal Fatigue is usually caused by bending stress from repeated passes over sheaves, or from vibration such as crane pendants. **Fatigue Breaks** can be either external or internal. They also can be caused by wobbly sheaves, tight grooves, poor end terminations. In the absence of all these causes, remember that all wire rope will eventually fail from fatigue.

FATIGUE BREAKS



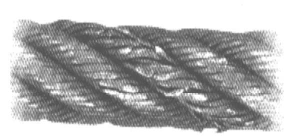
BIRDCAGE



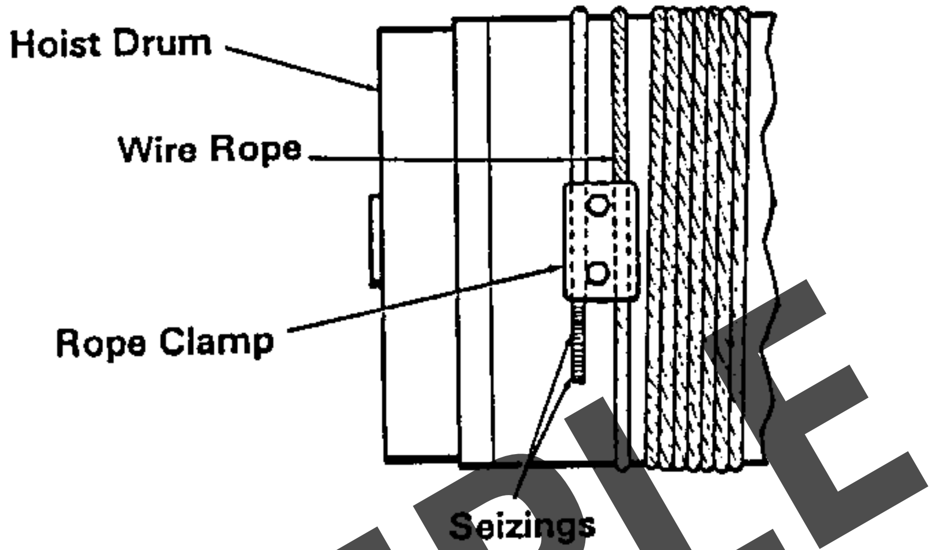
Bird Caging is a result of mistreatment such as sudden stops, wound on too tight of drum, or pulling through tight sheaves. The strands will not return to their original position

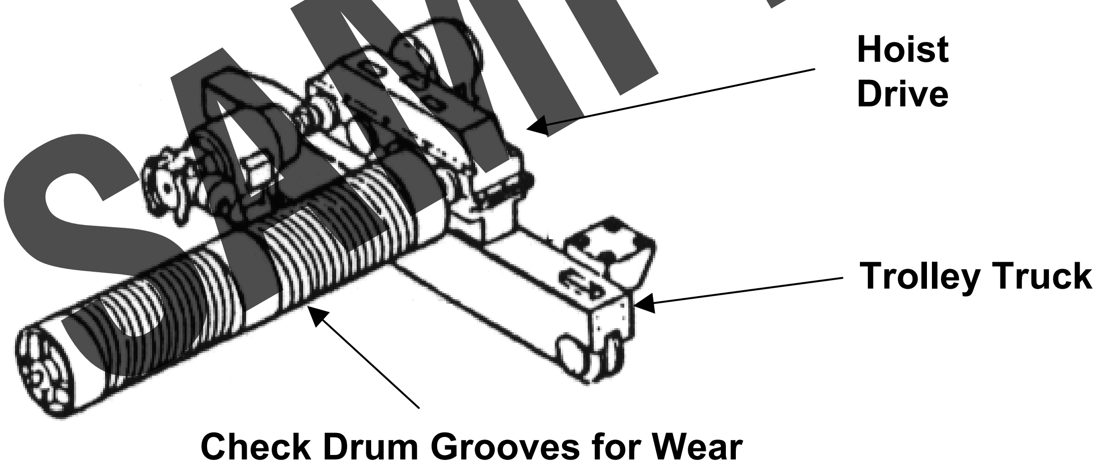
High Stranding is a condition caused when overloading and crushing take place and the other strands become overloaded.

HIGH STRAND



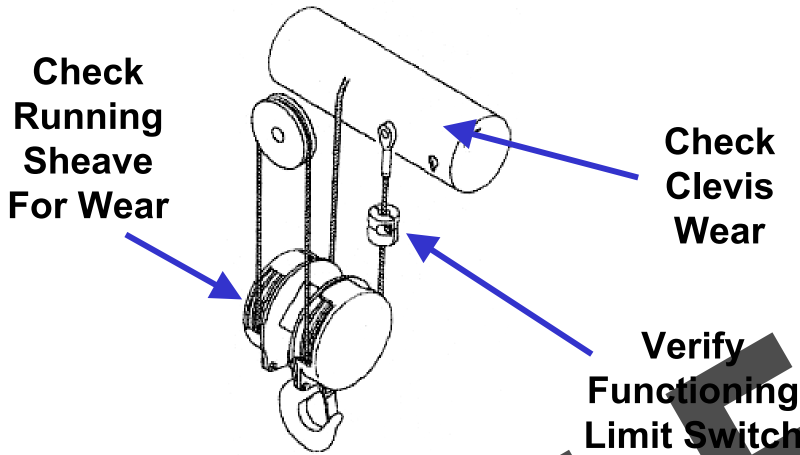
INSPECTING THE HOIST



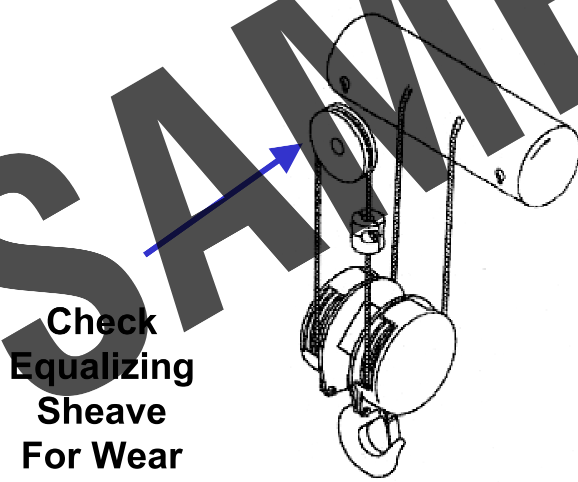


1. Check to make sure the wire rope is spooled properly on the drum.
2. On lagged drums, make sure the rope hasn't jumped a groove which could damage the rope.
3. Check to make sure the dead end is secured properly.
4. Never hoist down to the point that there would be less than 2 wraps left on the drum.

INSPECTING THE HOIST



SINGLE REEVED DRUM

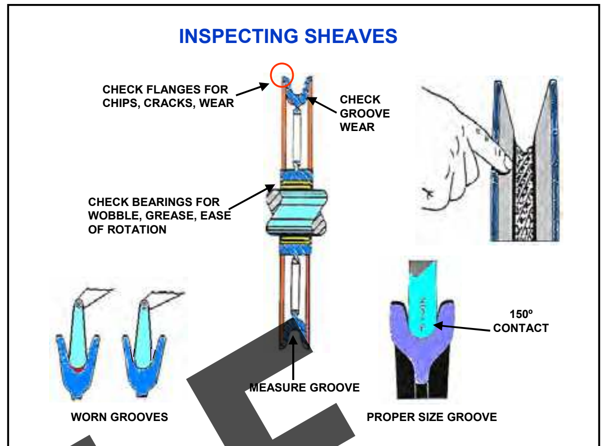


DOUBLE REEVED DRUM

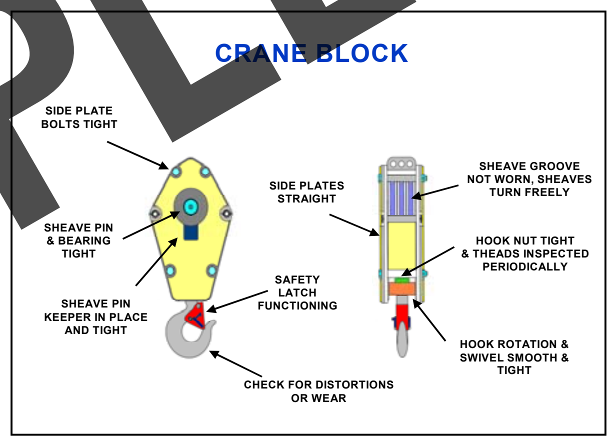
1. **Check running and equalizing sheaves for wear and free movement.**
2. **Check the limit switch to make sure it stops the hook or load if two-blocked.**
3. **Check the oil often, especially if you detect any leakage.**

BLOCK INSPECTION

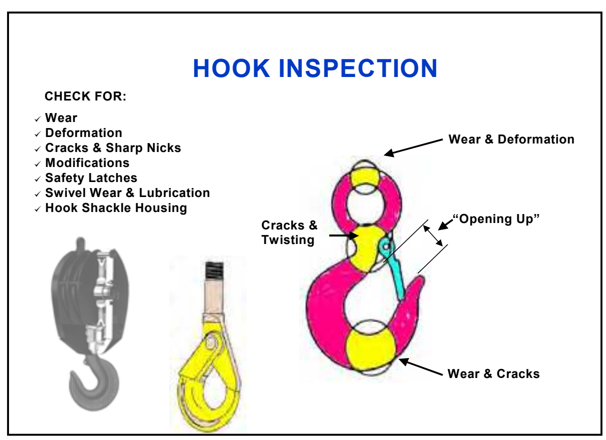
- Check sheaves for bearing wear and lubrication.
- Check the flanges and treads. Use a sheave gauge.
- Sheaves can only be repaired per manufacturer's procedures.



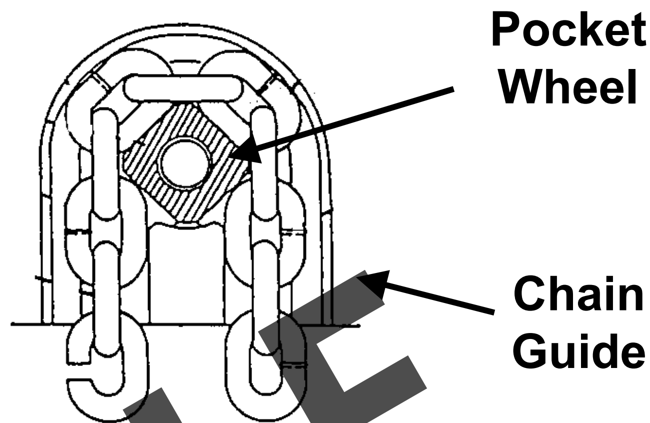
- The sheaves and bearings need to be checked on crane blocks.
- Check the side plates and any additional weights attached to the sides need to be checked for loose or missing bolts or fasteners.
- The hook and shank nut should be separated periodically and the threads inspected for corrosion and other damage.
- The safety latch must be in place and functioning properly.
- The hook should rotate freely on the swivel bearing. Check for excessive movement.



- Wear in excess of 5% in the neck of the hook and 10% in other areas is cause for removal.
- An increase in the hook throat opening of more than 15% is cause for removal
- Any twist in the hook of more than 10% is cause for removal.
- Hooks can only be repaired per manufacturer's procedures.

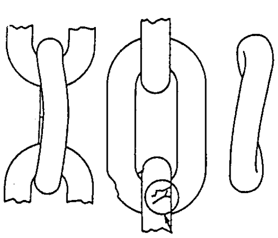


CHAIN INSPECTION

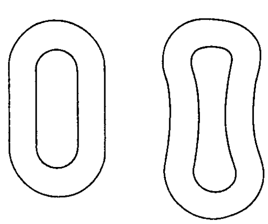


The chain hoist should be checked for the following:

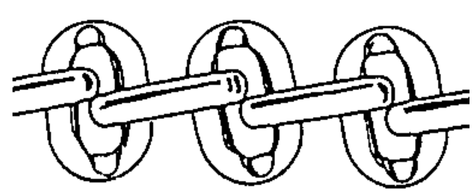
1. **Bent links (Usually a sign that it has been used to wrap around a load and bent on sharp corners)**
2. **Stretched links. The links will be sucked in slightly on the sides. Also, measure 5 links and check that measurement during your annual inspection.**
3. **Chain should not be rusted or brown. If the crane is in a corrosive atmosphere, be sure to oil it often.**



Bent Links



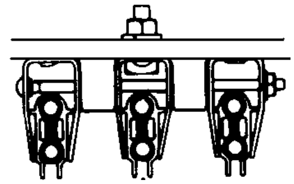
Stretched Links



Worn Links

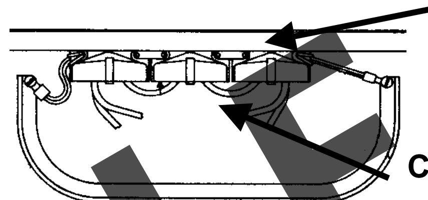
ELECTRICAL INSPECTION

Check Collectors for:
- Good spring tension
- Collector surfaces are not corroded or burned
- Electrical connections
- Ease of movement



Current Collectors Ride on this Surface

Check Conductors for:
- Loose fasteners
- Burned surfaces
- Dirt and corrosion
- Electrical connections

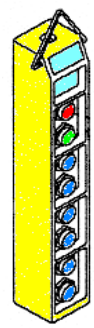


Electrical Conductors

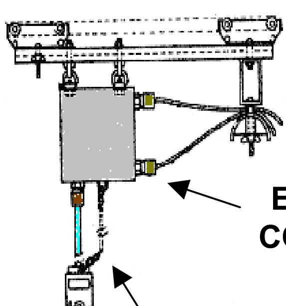
Current Collectors Ride Against Conductors

Check Pendant Controls for:
- Emergency stop button works
- Stuck or broken controls
- Strain relief properly fastened
- Warning labels and instructions

ALL CONTROL FUNCTIONS CLEARLY LABELED

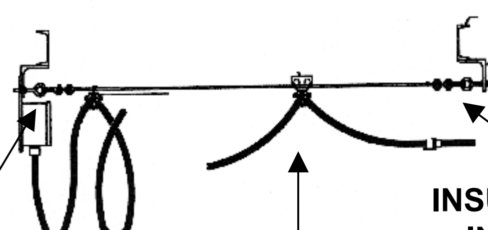


FESTOON INSPECTION



ELECTRICAL CONNECTORS TIGHT

STRAIN RELIEF ADJUSTED FOR CORRECT LENGTH

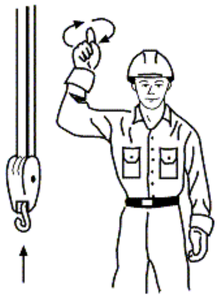


PROPER CABLE TENSION

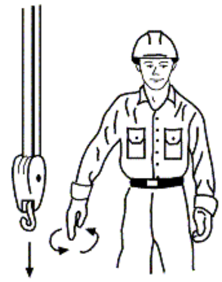
FREE TROLLEY MOVEMENT

INSULATORS IN GOOD CONDITION

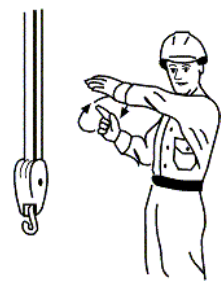
HAND SIGNALS



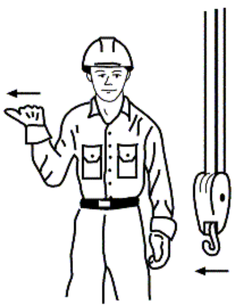
HOIST



LOWER

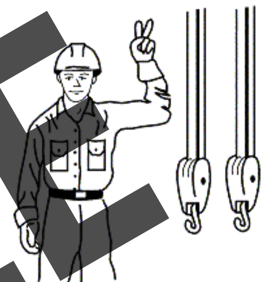


SLOWLY

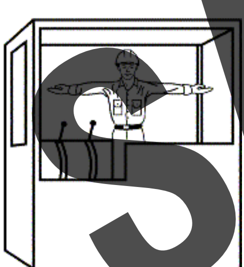


TROLLEY
TRAVEL

BRIDGE
TRAVEL

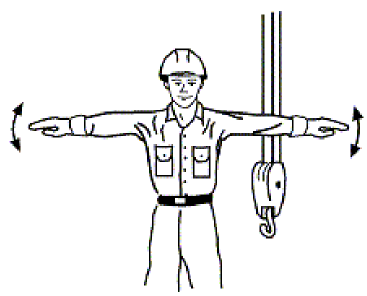


MULTIPLE
TROLLEYS



MAGNET
DISCONNECTED

STOP



EMERGENCY
STOP

Audible and discernible voice communication should be kept with the operator at all times. If this cannot be accomplished, a signal system should be used. Standard signals as shown above; however, it may be necessary to create special signals in certain circumstances. In these circumstances, the signals must be understood and agreed upon by all individuals using the crane.

SAFE CRANE OPERATIONS

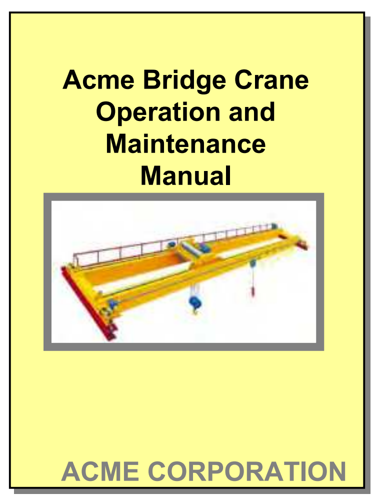
- Read and understand the operators manual
- Follow all placards, warning labels and signs on machine
- Know the SWL of the crane and never exceed it
- Determine the weight of the load from accurate sources
- If an estimate of the load is near the max. capacity of the crane, then use a dynamometer to measure the exact weight
- Use a loud signal, such as a whistle, horn or bell or verbal warning to alert employees of crane movement
- Never hoist a load over the heads of employees
- Never use limit switches or end stops as operating controls
- Begin each shift by testing the upper limit switches
- Avoid running the crane into the end stops or limit switches
- Never walk backward when guiding a load
- Never hoist two or more separately rigged loads on a single hook even if the combined weight is within the capacity of the crane
- Never wrap the hoist line around the load
- Never electrical load and/or hoist-limit switches or warning devices
- Start lifts slowly and avoid shock loading
- Always place the hook directly over the center of gravity or the designated lifting point
- Use taglines to help maneuver the load
- Never use taglines to swing the load
- Before hoisting the load, check for loose parts that might shift or fall
- On cranes with wire rope hoist lines, there should never be less than two wraps on lagged (grooved) drums and three wraps on unlagged
- When lifting near or at capacity, test the brakes after the load is raised a few inches
- Suspend and transport loads at a level that allows the operator a clear view
- Never drag slings, cables or chains across the floor

SAFE CRANE OPERATIONS

Cab-operated overhead cranes:

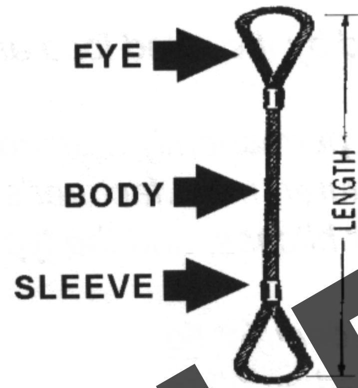
- **Enter and exit cab only through approved access ways**
- **Never walk along runway tracks**
- **Never climb or jump from one crane to another**
- **Use both hands to climb access ladder**
- **Keep unnecessary items out of the cab**
- **Complete the pre-shift inspection checklist before operation**
- **Know the location of emergency shutoff switches**
- **Know emergency evacuation routes**
- **Place all controls in the OFF position before turning the main switch ON**
- **Maintain a portable fire extinguisher in the cab**
- **Never move the cab without a signal from the designated signal giver**
- **Avoid bumping crane and carriage stop blocks**
- **If a power failure occurs, place all controls in the OFF position**
- **Park the cab in an approved, designated position**

Read and understand the operators manual



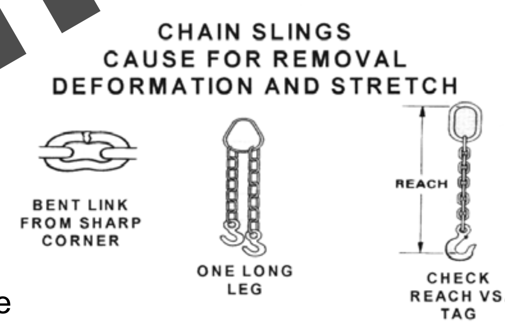
WIRE ROPE SLING INSPECTION

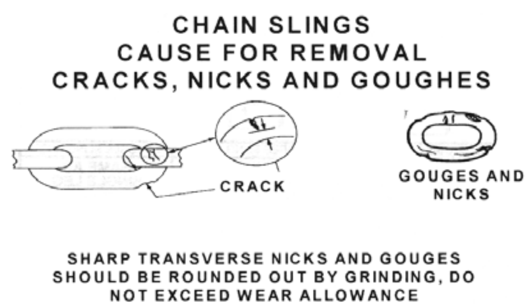
KINKING
CRUSHING
UNSTRANDING
BIRDCAGING
STRAND DISPLACEMENT
CORE PROTRUSION
CORROSION
BROKEN OR CUT
STRANDS
BROKEN WIRES



Wire rope slings need to be inspected in the same way wire rope is and a **record kept of those inspections**. All slings must have a tag on them indicating the capacity or they must be taken out of service.

Chain slings are to be inspected regularly and a record kept of these inspections also. Again, if there is no capacity tag, it must be taken out of service.
Chain slings are often used to hold steel while it is being welded. Always check to make sure heat damage has not occurred. Heat damage can be detected by discolored metal.

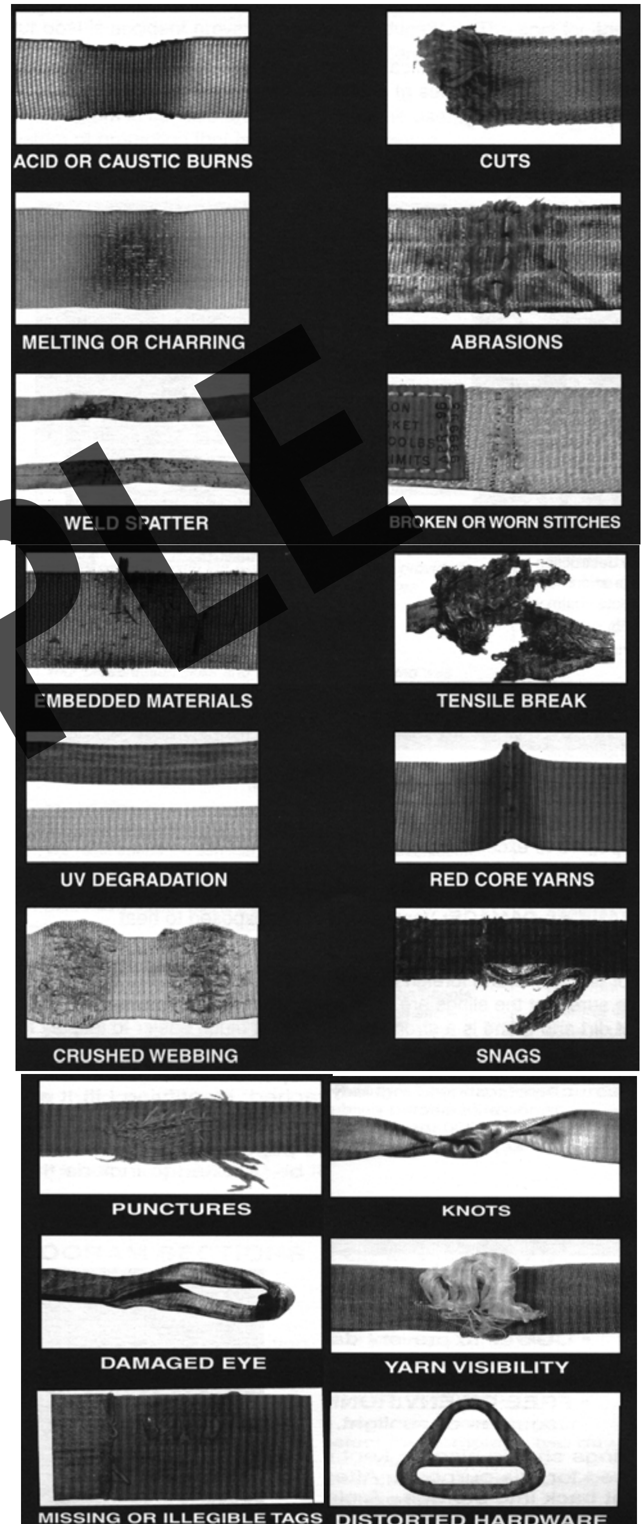




SYNTHETIC SLING INSPECTION

Far too many web slings have to be discarded prematurely simply because abusive or careless work habits caused irreparable damage.

To the right are some examples of damaged slings.

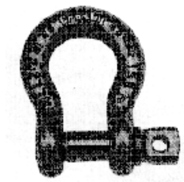


Regardless of whether a sling shows damage from abuse or regular wear, the overriding rule in all cases is that the sling eyes should be cut, and the sling discarded immediately whenever damage is detected.

When using synthetic slings, remember:

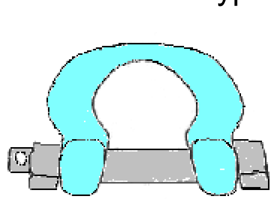
- Slings without a capacity tag should be discarded. That tag should have the following information:
  - -Name and trademark of manufacturer.
  - -Manufacturer's code or stock number.
  - -Rated loads (rated capacities) for the type of hitches used.
  - -Type of synthetic material.
- Use wear pads on corners to protect the sling from cuts, or abrasions.
- Do not pull the sling out from under the load if caught under it.
- Take into consideration the sling angles when calculating the capacity of the sling to handle the load.

SHACKLE INSPECTION

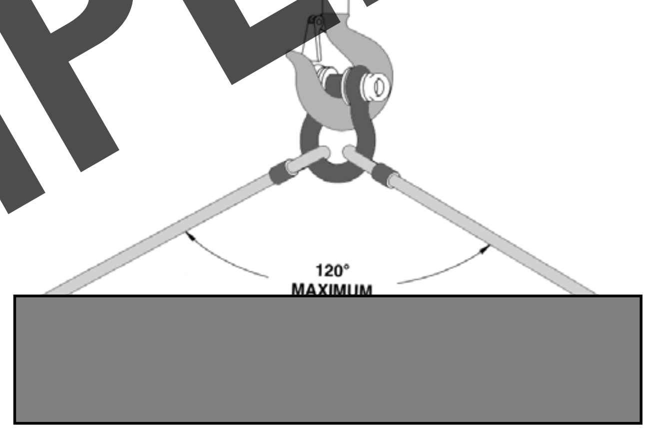



The working load limit (WLL) must be printed on the shackle or it must be taken out of service. This WLL is for vertical lifts only.

Only two types of shackles are to be used in rigging for lifts. The screw pin type and the bolt type shackle.



Shackles that are deformed or damaged must be removed from service.



Side Loading Reduction Chart For Screw Pin & Bolt Type Shackles Only†	
Angle of Side Load	***Adjusted Working Load Limit***
0° In-Line	**100% of Rated Working Load Limit**
45° from In-Line	**70% of Rated Working Load Limit**
90° from In-Line	**50% of Rated Working Load Limit**

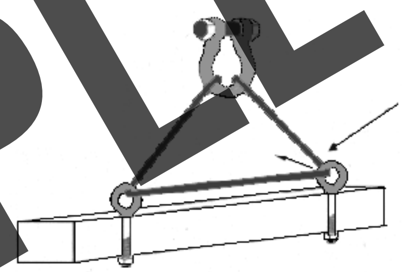
† DO NOT SIDE LOAD ROUND PIN SHACKLES

EYE BOLTS

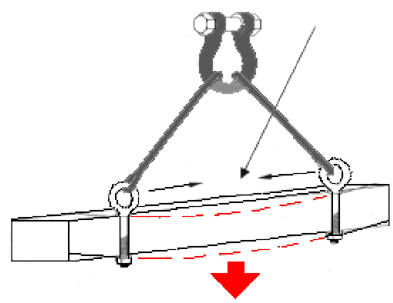
Eye bolts should always be inspected before use. Look for signs of wear and damage. Look to see if shank is bent or elongated. Make sure the threads on the shank and the receiving hole are clean.

DIRECTION OF PULL	ADJUSTED WORKING LOAD
In-Line	Full Rated Working Load
45 Degrees	30% of Rated Working Load
60 Degrees	60% of Rated Working Load

- Always use Shouldered Eye Bolts for angular lifts.
- For angular lifts, reduce working load according to chart.
- Never exceed load limits.
- Always screw eye bolt down completely for proper seating.
- Always tighten nuts securely against the load.
- Always stand clear of load when lifting.
- Always lift load with steady, even pull-do not jerk.
- Do not reeve slings from one eye bolt to another.
- Never machine, grind or cut the eye bolt.

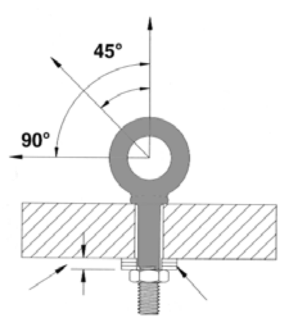


WRONG!



CAUTION

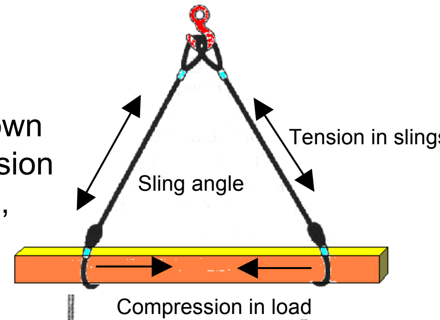
STRUCTURE MAY BUCKLE FROM COMPRESSION FORCES

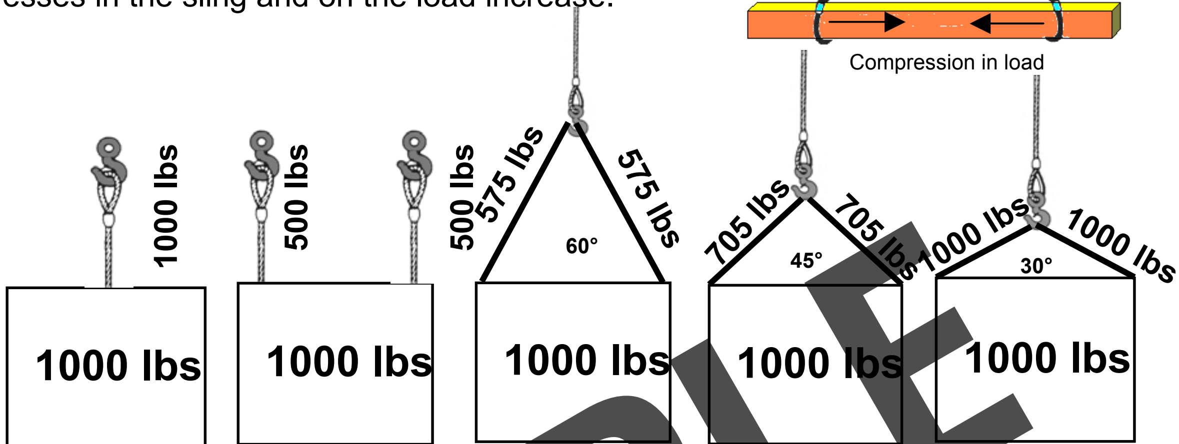


Shoulder Nut
Eye Bolt

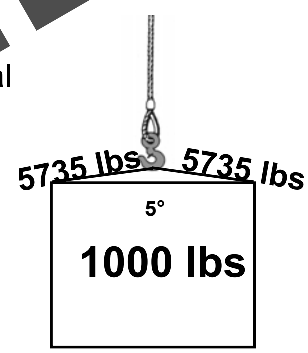
SLING ANGLES

When slings are brought together and form a hitch, as shown at right, the stresses in the slings increase and a compression force on the load is created. As the sling angle decreases, the stresses in the sling and on the load increase.





Sling angles of 60 degrees are the best to use because of the minimal increase of stress in the slings. When required to use smaller sling angles, slings need to be selected based on the increased stress and not on the weight of the load. The compression in the load also has to be considered. When the sling angle is 30 degrees for a 1000 lb load, the compression which is crushing the load will be 866 lbs. Depending on the structural strength of the load, it may be damaged.

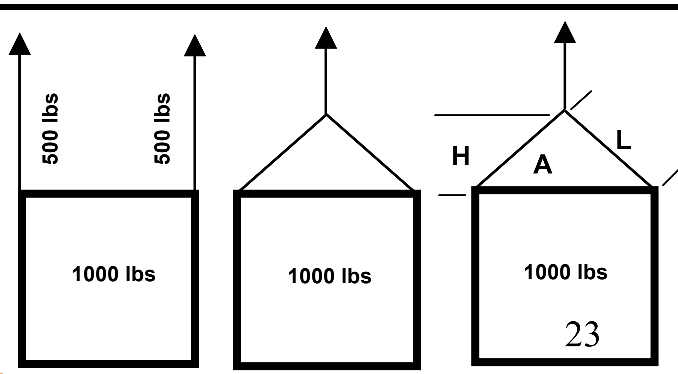


All that is needed to calculate the stress in a sling is the weight of the object and a measuring tape.

Sling Angle Degree (A)	Load Angle Factor = L/H
90	1.000
60	1.155
50	1.305
45	1.414
30	2.000
Load On Each Leg Of Sling = (Load/2) x Load Angle Factor	

Example:

If the sling was 8' long and the height (H) was 4', then 8 divided by 4 equals 2 which equals the **Load Angle Factor**. So, if the load is 1000lbs, each sling is required to support 500lbs. The stress in the sling is equal to 500lbs x the load angle factor of 2 or 1000lbs.



CALCULATING LOAD WEIGHT

Importance of load weights

The weight of the load to be lifted must be known to prevent overloading of the crane.

You must know the weight of the load to prevent damage to the crane

If you must estimate, never boom out to a point where the estimated weight would exceed 50% of the capacity of that load zone. In other words, make the best estimate you can and then multiply it by 2 to determine the safest load zone you can operate in.

Acceptable methods of determining weight

You may find the weight from:

- Data on manufacturing label plates.
- Manufacturer documentation.
- Blueprints or drawings.
- Shipping receipts.
- Weigh the item.
- Bill of lading (be careful)
- Stamped or written on the load
- Approved calculations

Never use word of mouth to establish the weight of an item!

CALCULATING LOAD WEIGHT

To find the weight of any item you need to know its volume and unit weight.

- Volume x Unit weight = Load weight
- Unit weight is the density of the material

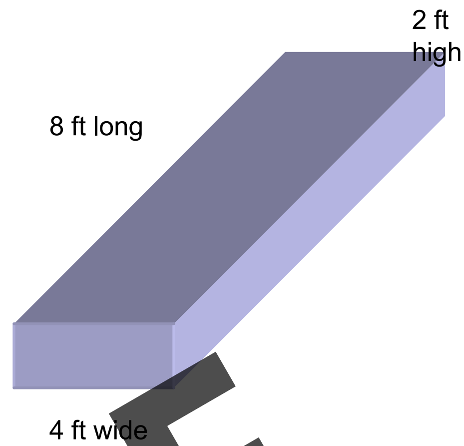
Here are some examples of common materials and their unit weight:

WEIGHTS OF MATERIALS BASED ON VOLUME (lbs. Per cubic ft.)

MATERIAL	UNIT WEIGHT	MATERIAL	UNIT WEIGHT
METALS		**TIMBER**	
Aluminum	165	Cedar	34
Brass	535	Cherry	36
Bronze	500	Fir, seasoned	34
Copper	560	Fir, wet	50
Iron	480	Hemlock	30
Lead	710	Maple	53
Steel	490	Oak	62
Tin	460	Pine	30
MASONARY		Poplar	30
Ashlar masonry	160	Spruce	28
Brick, soft	110	White pine	25
Brick, pressed	140	Railroad ties	50
Clay tile	60	**LIQUIDS**	
Rubble masonry	155	Diesel	52
Concrete, cinder,	110	Gasoline	45
haydite	130	Water	64
Concrete, slag	144	**EARTH**	
Concrete, stone	150	Earth, wet	100
Concrete, reinforced		Earth, dry	75
MISC.	80	Sand and gravel, wet	120
Asphalt	160	Sand and gravel, dry	105
Glass			

CALCULATING LOAD WEIGHT

CALCULATING VOLUME



Volume of a cube

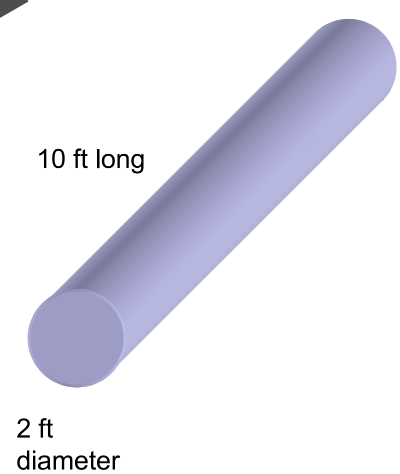
Length x Width x Height = Volume

8 ft x 4 ft x 2 ft = 64 cubic feet

If the material was **cedar**, then all we need to do to determine it's weight would be to multiply the unit weight of cedar x 64.

Unit weight x Volume = Weight

34 lbs per cubic foot X 64 cubic ft. = 2,176 lbs.



Volume of a cylinder

Pi (π) x Radius Squared x Length = Volume

π = 3.14

3.14 x 1^2 ft x 10 ft = 31.4 cubic ft

If the material was **reinforced concrete,** then all we need to do to determine it's weight would be to multiply the unit weight of reinforced concrete x 31.4.

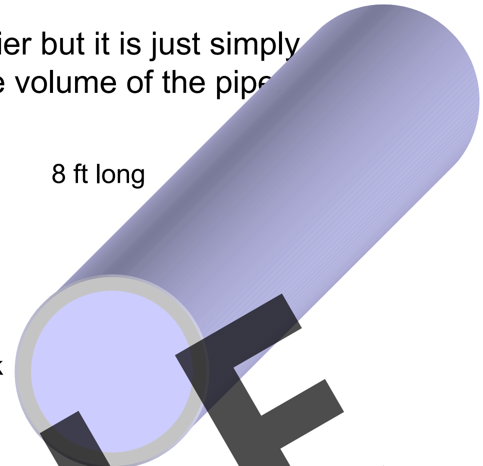
150 lbs per cubic foot x 31.4 cubic ft. = 4,710 lbs.

CALCULATING LOAD WEIGHT

Volume of pipe

Calculating the volume of pipe is a bit trickier but it is just simply subtracting the volume of the hole from the volume of the pipe.

If the pipe were one inch thick, three feet in diameter and 8 feet long, then we would figure the volume of the entire pipe and subtract the volume of the hole to get the the volume of the material.



3.14 x (1 ½ ft.)² x 8 feet = total volume of pipe (56.52 ft³)

3.14 x (1ft 5 in.)² x 8 feet = volume of hole (50.41 ft³)

56.52 ft³ – 50.41 ft³ = 6.11 ft³

Volume of material x unit weight = total weight

If this pipe were **steel** then the unit weight would be 490 lbs.

6.11 x 490 lbs = 2,994 lbs.

For thin pipe a quick way to ***ESTIMATE** the volume is to split the pipe open and calculate the volume like a cube. The formula would be:

π x diameter = width, so:

π x diameter x length x thickness x unit weight = weight of object

3.14 x 3 ft x 8 ft x 1/12 ft (or .008 ft) x 490 lbs = *3,077.2 lbs

CALCULATING LOAD WEIGHT

WEIGHT TABLES

Weight tables are an excellent way to calculate load weight. If you are handling certain materials often, then having a chart that gives you the weight per cubic foot, cubic yard, square foot, linear foot or per gallon is handy. Here are a few examples:

METAL PLATES

1 INCH STEEL PLATE weighs approximately 40 lbs per sq. ft.
1/2 inch steel plate would then be about 20 lbs. per sq. ft.

A steel plate measuring 8 ft. x 10 ft. x 1inch would then weigh about 3,200 lbs. (8 x 10 x 40 lbs = 3,200 lbs.)

BEAMS

Beams come in all kinds of materials and shapes and lengths. STEEL I-BEAMS weigh approximately 40 lbs a linear ft. at 1/2 inch thick and 8 inches x 8 inches. If it were 1 inch thick then it would be 80 lbs a linear ft. If it were 20 feet long at 1 inch thick then it would weigh about 1,600 lbs. (20 ft. x 80 lbs. = 1,600lbs.)

There are weight tables for everything from creosoted pine poles to Steel coils. Take advantage of these. But, if you don't know for sure the weight of a load and there are no other resources available to help you, don't hesitate to do the calculations yourself.

Student Manual

Overhead Crane Operator Safety Training

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