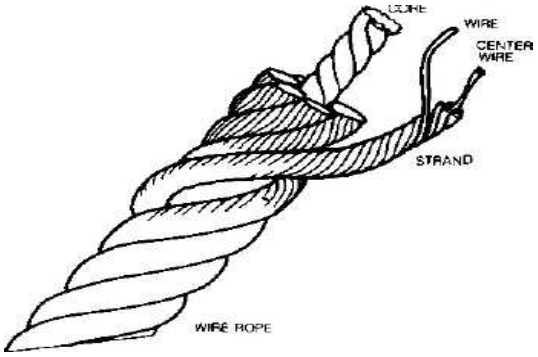
WIRE ROPE

Construction — Wire rope is made from multi-wire strands laid in a spiral around a core of fiber or steel. It is always made larger, never smaller, than the nominal or rated diameter. For example, a 1-inch nominal diameter rope may vary between 1 and 1 finches.

The core is the foundation of a wire rope and affects its bending and loading characteristics.

The design of a rope is also determined by strand construction — the number and arrangement of wires in each strand —and rope construction— the number and arrangement of strands in each rope.

Ropes are classified by the number of strands and the number of wires in each strand: 6 x 7 , 6 x 19, 6 x 37, 8 x 19. However, these are nominal classifications. For example, the 6 x 19 class includes ropes made with strands containing from 15 to 26 wires. Ropes within the sarne class may have different working characteristics. To avoid mistakes in application it is important to order a specific construction, or to provide the supplier with a description of the intended use.



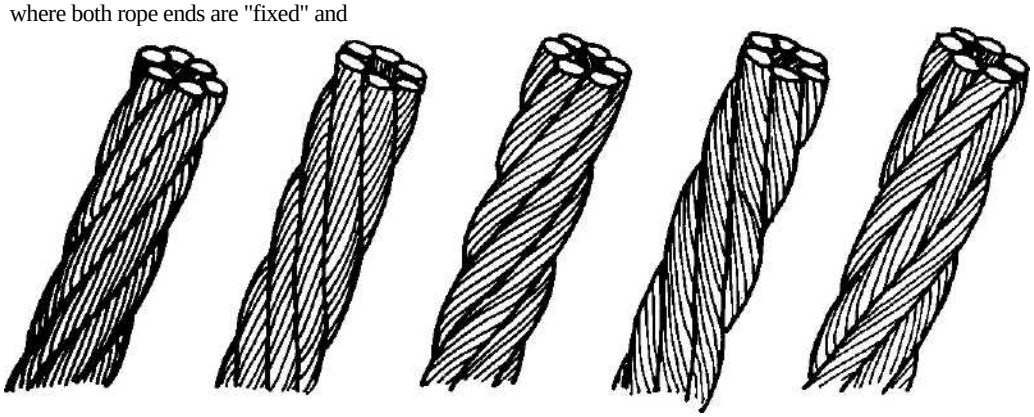
WIRE ROPE LAY

Right lay: clockwise.

Left lay: counter-clockwise.

Regular lay: wires in strands are laid in the opposite direction of the strands, and are parallel to the rope axis. Ropes with regular lay are easy to handle and have greater resistance to crushing than those with lang lay.

Lang lay: wires are laid in the same direction as the strands of the rope, and at an angle to the rope axis. Longer lengths of the individual wires are exposed, creating greater resistance to wear and improved flexibility. Lang lay ropes should only be used where both rope ends are "fixed" and



USING WIRE ROPE

Wire rope is gradually consumed by wear and tear, and consideration must always be given to the gradual decrease in load-bearing capacity that occurs in a wire rope system, regular and careful inspection of the components in a wire rope system is essential.

Wire rope that has been worn or damaged develops "thorns" or "fishhooks", protruding strands of broken wire that stand up from the lay. Be careful because they can slash your hands. Always wear leather gloves around running wire.

Safe working loads — A safe working load depends on the nominal strength of the rope and the efficiency of end attachments. There are two ways of attaching a rope: by forming an eye or by placing a fitting on the end. Wire rope may be pushed toward its ultimate breaking strength. Be aware that two ropes rated as having the same safe working loads may differ substantially in ultimate breaking strength.

Bending stress — Ropes operating over sheaves or drums may be subject to fatigue if the sheave or drum diameters are too small, if loads are excessive, of if the sheaves or drums are worn. Reverse or S bends from one sheave to another cause

greatly accelerated fatigue and should be avoided. Rope speed must also be considered: the higher the speed, the larger the sheave required.

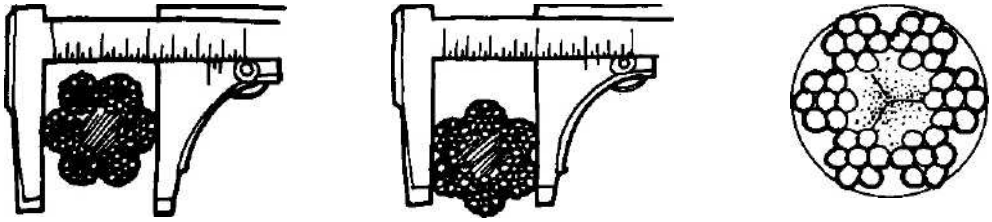
The diameter of a sheave should never be less than 15 times the diameter of the rope, generally larger. The larger the sheave and the slower the speed, the better. All manufacturers prescribe minimum sheave diameters, and their guaranteed breaking strengths and estimated safe working loads assume the use of minimum or larger sheave diameters and moderate working speeds. High speeds cause wear because of friction over the sheave, but even more so because of the friction of the wires against one another.

Measuring grooves on a sheave — Under normal operating conditions, as a groove wears it tends to get deeper and narrower until replacement of the sheave becomes necessary. Excessive side wear may indicate mis-alignment in the system. A properly fitted sheave groove should support the rope over 135-150 degrees of rope circumference. Field gauges are made to the nominal diameter of the rope PLUS one-half the allowable oversize. In an on-board inspection, when the gauge for worn grooves fits perfectly, the groove is at the minimum acceptable size.

A worn, corrugated sheave groove will quickly damage a new rope.

Sheave inspection should also include the condition of bearings and shafts. A sheave rotated by hand should run true, without wobble. The groove should be round in relation to the shaft, and -each sheave and shaft should be properly aligned.

Winding with the lay — You must follow the lay when you wind the rope on a drum to ensure

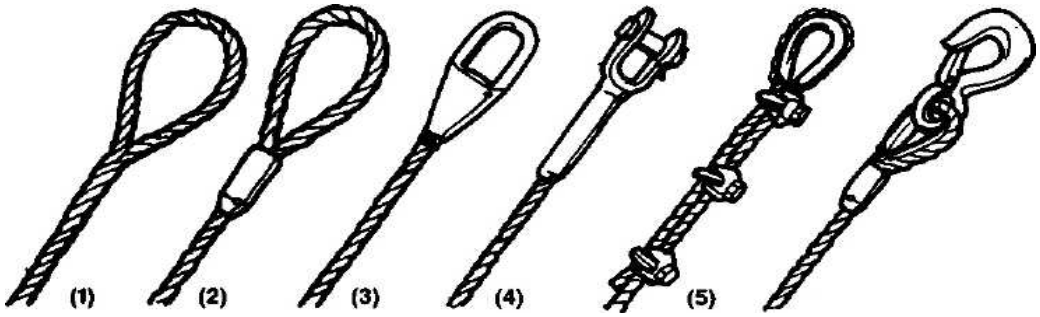


Right ***Wrong*** ***Actual diameter***

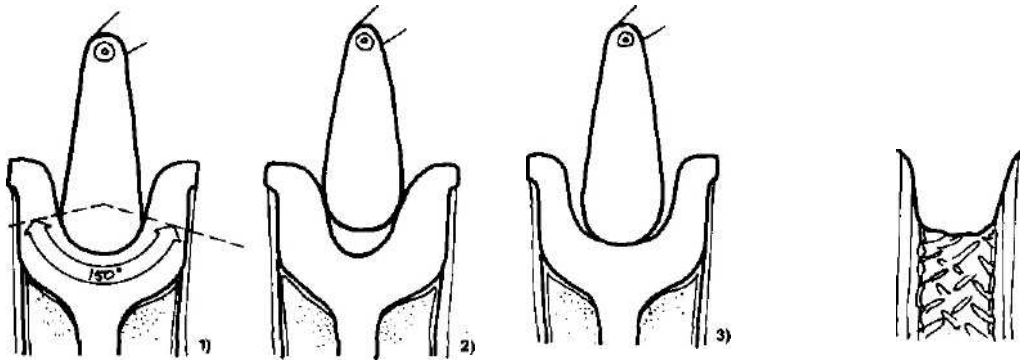
that the wraps hug together and form an even layer. Winding against the lay causes the wraps to spread so that the rope may cross over itself and become crushed or flattened.

Extending rope life

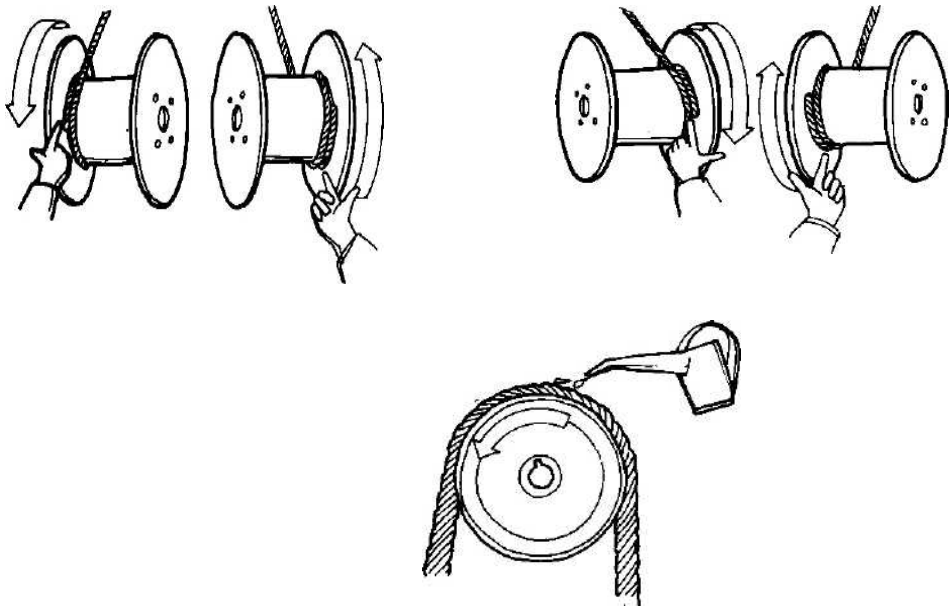
- Break-in new rope with light loads and controlled speeds to allow the wires and strands to adjust to each other.
- If wear occurs near the ends, cut them off to move the wear points.
- Reverse the ends to bring less worn sections into areas where conditions are destructive, and you've almost got new rope. Take care to avoid kinking or other damage in the process.
- Clean and lubricate. Wire rope is a machine with moving parts, and factory lubricants don't last forever. Clean the surface so new lubricant can penetrate to the core, but don't use lubrication-destroying solvents. Use a light-bodied, penetrating lubricant applied by dripping, spraying or brushing. Apply it at the top of a bend over a sheave where the strands open up.



***End attachments with efficiency as a percent of rope strength. 1) hand splice (80% to 90%); 2) mechanical splice (90% to* 95%*); 3) spelter socket (100%); 4) swaged socket (95% to 100%); 5) wire rope clips (75% to* 85%/- 6*) mechanical splice thimble (90% to* 95%/



Measuring grooves on a sheave: 1)correct; 2)too tight: 3)too loose: 4)corrugated sheave groove



INSPECTION

Regular inspection determines when a rope can no longer be used safely, and helps pinpoint faults in your equipment or operation that are causing costly and potentially dangerous rope wear.

Whenever significant numbers of wire breaks occur, or when obvious signs of damage appear, your rope ought to be replaced.

Chisel fractures mean the outside wires have been worn away by abrasion. When outside wires have been wom to one-half their original diameters, the wire has served its time and ought to be replaced.

Peening is distortion caused by pounding rather than abrasion. Excessive peening causes fatigue breaks and means there is a problem in your system that ought to be repaired.

Square-end breaks may occur even in relatively new ropes if there is excessive vibration or too much bending. Any sudden increase in such breaks means the rope ought to be replaced.

Cup and cone fractures are the result of overloads. Such breaks should not occur if your rope is operating under safe loads.

Reduction in diameter: a sharp reduction in diameter indicates core failure or internal corrosion. Either way, replacement is necessary.

Increased lay length: any increase in lay length (the distance a single wire travels in making one complete turn around the rope) should be viewed with concern. It may indicate core failure and means the rope should be replaced.

Corrosion of outside wires will produce accelerated wear because the wires will no longer tolerate bending. Internal corrosion means the rope is unsafe and should be replaced. Corrosion is a particular problem for trawlers, which use wire rope extensively in the highly corrosive salt water environment.

Accidental damage caused by the rope jumping a sheave or being struck by a falling weight calls for close inspection and constant checking. It will be impossible to determine the remaining strength, and replacement may be required.

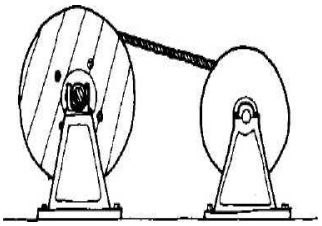
Chisel frcture square-end break cup&cone fracture

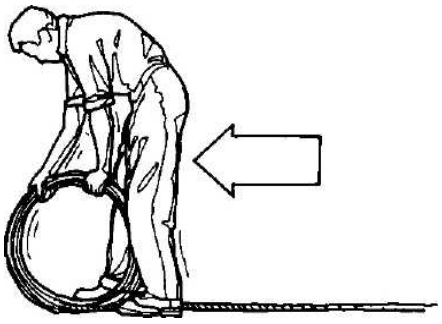
ROPE HANDLING

Taking a rope from a reel — The reel must be mounted on a shaft or turntable so it is capable of rotating, or rolled along the ground as the rope is paid out. Never pull rope over the flange of a stationary reel.

Storage — Ropes should be cleaned, lubricated, wound on a reel and stored indoors and away from corrosive atmospheres.

Seizing and cutting — Place seizings securelly on each side of the point where a cut is to be made to prevent the rope strands from exploding or flying apart. The seizing should be tight enough so no strands are even slightly displaced.





Rope on drums-Wien winding rope from one reel to another or from a reel to a drum, avoid reverse bends that will make the rope "twisty" and hard to handle. Wind from top-to-top or from bottom-to-bottom Always wind rope taut and even on the drum to avoid slack. The turns in one row should never overlap one another, and the first layer on a smooth drum should be wound tight and left as "dead wraps" that are never removed. In paying out. avoid overruns- the result is slack rope on the drum and excess abrasion as the slack is taken up. You may even part a slack rope if Ine drum is started suddenly.