Winching Lines

Proper procedures will prevent kinks and hockles in 3 strand twisted rope.

Repeated hauling of a line over a winch in a counterclockwise direction will extend the lay of twisted rope and simultaneously change the twist of each strand. As this action continues, strand hockles or back turning may develop. Once these hockles appear, they cannot be removed, and the rope is permanently damaged at the point of hockling. If the line is continuously hauled over a winch in a clockwise direction, the rope lay is shortened, and the rope becomes stiff and will kink readily.

Splicing

Join rope ends by splicing.

Most ropes can be spliced. This is the preferred method of joining ropes. A good splice, using the recommended method, should not reduce the strength of a rope by more than 10%. Knots can decrease rope strength by as much as 60%. Use the manufacturer's recommended splices for maximum efficiency. Other methods of joining rope ends can be used, but strength loss with a particular type of rope construction should be researched, not assumed.

Hardware

Hardware components must match.

Make certain that components such as hooks, clamps or pulleys are of suitable material and strength to provide adequate safety protection. Attachments must be properly installed and have a **working load limit** of at least equal to the product with which they are used.

Chemicals

Avoid unnecessary exposure to chemicals, acids and alkalis.

Chemicals can severely weaken a rope without leaving obvious signs, especially battery acid and solvents. Even the vapors from chemicals can weaken a rope. This is particularly true for natural fiber ropes. Consult the manufacturer for recommendations based on chemical resistance properties, or for information pertaining to exposure to specific chemicals, such as to solvents, acids or alkalies.

Heat

Avoid overheating.

Heat can seriously affect the strength of rope. When using rope in temperatures exceeding 140˚F, in applications where rope is continuously exposed to heat, or any situation where rope is too hot to handle, consult the manufacturer. When using ropes on a capstan or winch, care should be exercised to avoid surging while the capstan or winch head is rotating. Friction from this slippage causes localized overheating, which can melt or fuse synthetic fibers, or burn natural fibers, resulting in severe loss of tensile strength.

Caution should be exercised when using synthetic fiber ropes at elevated temperatures. Synthetic ropes will show a reduction in strength when used at a high heat, and may fail under loads well below its published break strength. Additionally, synthetic ropes can exhibit heat weakening or failure even when used under normal conditions, if ropes are stored in a high temperature environment.

***CAUTION:* Heat can seriously affect the strength of synthetic ropes. Polypropylene can lose up to 50% of its strength at 150˚F; Nylon, at 350˚F: Polyester at 350˚F. Check with manufacturer for information about any synthetic ropes not listed here.**

Abrasion

Avoid all abrasive conditions.

Any rope can be severely damaged if subject to rough surfaces or sharp edges. Chocks, bits, winches, drums and other surfaces that come into contact with a rope must be kept in good condition, free of burrs and rust. Pulleys must be able to rotate freely, and should be of proper size to avoid excessive rope wear. Restraining clamps and similar devices can weaken rope, and should be used with extreme caution. Never step on a rope. When dirt or grit is worked into the sheath, it will invisibly abrade the core.

The Cordage Institute publishes standards for strengths, weights and testing procedures. Please contact CWC for a copy of the publications list.

Dynamic Loading

Do not overload rope. Sudden strains of shock loading can cause failure.

Avoid sudden strain - shock loads can exceed breaking strength and cause failure of a rope normally strong enough to handle the load. Working loads are not applicable when the rope is subject to significant dynamic loading. Whenever a load is picked up, stopped, moved, or swung, there is an increased force, due to dynamic loading. The more rapidly or suddenly such actions occur, the greater this increase will be. In extreme cases, the force put on the rope may be two or more times the normal load involved. Examples include picking up a tow on a slack line, or using a rope to stop a falling object. Working loads as given may not apply in applications as such as tow lines, life lines, safety lines or climbing ropes, unless specified otherwise.

Users should be aware that dynamic effects are greater on a low elongation rope such as manila, than on a high elongation rope such as nylon, and greater on shorter rope as opposed to longer. When a rope has been secured to a load, the load must be handled slowly and smoothly to minimize dynamic effect. Dynamic loading of a high-elongation rope, especially nylon, can be particularly dangerous. Energy stored in the rope can cause it to recoil at a high velocity if it fails, causing damage to property, injury or even death. (See *Special Safety Note*)

Checking for Wear

Avoid using rope that shows signs of aging and wear. If in doubt, discard the used rope.

No type of visual inspection can be guaranteed to accurately and precisely determine actual residual strength. When the fibers show wear in any given area, the rope should be re-spliced, downgraded, or replaced. Check the line regularly for frayed strands and broken yarns. Pulled strands should be re-threaded into the rope if possible. A pulled strand can snag on a foreign object during a rope operation.

Both outer and inner rope fibers contribute to the strength of the rope. When either is worn, the rope is naturally weakened. To check for wear, spread the rope strands slightly (both 3 strand or braided) and look for powdered fiber, one sign of internal wear. A heavily used rope will often become compacted or hard which also indicates reduced strength. Ropes should be discarded if these conditions exist.

Pulling from Coils & Reels

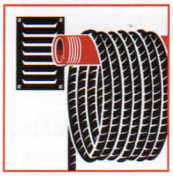
Remove rope properly from coils and reels to prevent kinking.

Rope which comes coiled should always be uncoiled from the inside, as directed by the manufacturer. If on a reel, rope should be removed by pulling it from the top while the reel is free to rotate vertically. This can be accomplished using a reel stand, or by suspending the rope on a pipe or rod placed horizontally through the reel center, high enough to allow the reel to rotate freely. Pulling the rope in any other manner may cause kinks or hockles.

Handling Rope

Handle rope properly to avoid accidents.

Swap rope ends regularly, particularly when used in tackle. This allows even wearing and assures longer, more useful rope life. When using tackle or slings, apply a steady, even pull to get full strength from rope. For maximum safety and economy, always use slings employing an angle of approximately 45°. Refer to previous page, regarding the dangers of excessive tension and snap back.



Storage & Care

All rope should be stored clean, dry, out of direct sunlight, and away from heat.

Cordage should be housed in a cool, dry and well-ventilated area. Rope should be kept off the floor, and on racks, to allow for adequate ventilation underneath. Never store rope on a concrete or dirt floor, and under no circumstances should rope and acid or alkalis be kept in the same building. Natural fiber ropes will mildew and decay if stored in wet conditions. Do not leave rope in direct sunlight. Polypropylene, polyethylene and other synthetic ropes are prone to degradation from long-term exposure to UV rays, and must be kept out of direct sunlight in order to maintain strength. Pigmented or UV-stabilized synthetic ropes have increased resistance to sunlight. UV degradation is indicated by discoloration and the presence of fiber splinters and slivers on the surface of the rope.