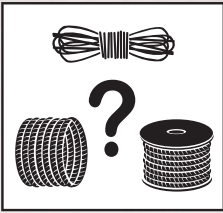




# Rope Usage Guide



**NOTE:** Because of the wide range of rope use, rope condition, exposure to the several factors affecting rope behavior, and the degree of risk to life and property involved, it is impossible to cover all rope applications in this section. In all cases where risk is involved, or there is a question about the condition of use, consult the manufacturer. This is not intended to apply to rescue rope. Consult the manufacturer for specific applications.

## **CHOOSING A ROPE** Always consult the manufacturer before using rope when personal safety or possible damage to property is involved.

Make sure the rope is adequate for the job. Do not use too small a rope or the wrong type. Specifications are available from your dealer, distributor, or the manufacturer, which gives the strength and recommended working loads for various sizes and constructions of hard fiber and synthetic rope.

## **REMOVING ROPE FROM COILS & REELS**

**Remove rope properly from coils or reels to prevent kinking.**

If the rope is in a coil, it should always be uncoiled from the inside as directed by the manufacturer. If on a reel, the rope should be removed by pulling it off the top while the reel is free to rotate. This can be accomplished by passing a pipe through the center of the reel and jacking both ends up in a horizontal position until the reel is free from the surface. To proceed in any other manner may cause kinks or hockles (strand distortion).



## **HANDLING ROPE** Never stand in line with rope under tension. If a rope or attachment fails, it can recoil with sufficient force causing physical injury. Synthetic rope has higher recoil/snapback tendencies than natural fiber rope.

Reverse rope ends regularly, particularly when used in tackle. This permits even wearing and assures longer, useful 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 about 45°.

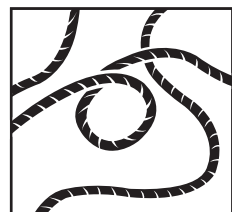
## **OVERLOADING**

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

Avoid sudden strains - shock loads can exceed breaking strength. Shock loading can 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, three, or even more times the normal load involved. Examples could be picking up a tow on a slack line or using a rope to stop a falling object. However, working loads as given do not apply in all such applications as towing lines, life lines, safety lines, climbing ropes, or the like.



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 a shorter rope than on a longer one. Excessive dynamic loading of a high elongation rope is equally dangerous, because of stored energy which will cause the rope to recoil dangerously if it breaks. When a working load has been used to select a rope, the load must be handled slowly and smoothly to minimize dynamic effect and avoid exceeding the provision for them.



## **WINCHING LINES**

**Proper procedures will prevent kinks and hockles in three-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 backturning 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.

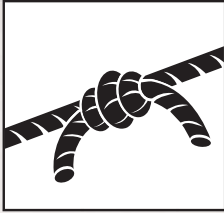
## **CHECKING ROPE FOR WEAR** Avoid using rope that shows signs of aging and wear. If in doubt, destroy the used rope.

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 respliced, downgraded, or replaced. Check the line regularly for frayed strands and broken yarns. Pulled strands should be rethreaded 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. Open the strands of rope (either three-strands or braided) slightly and look for powdered fiber, which is one sign of internal wear. A heavily used rope will often become compacted or hard which is indicative of reduced strength. The rope should be discarded if this condition exists.





# Rope Usage Guide

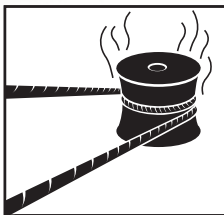


## **SPLICING** Join rope ends by splicing.

Knots can decrease rope strength by as much as 60%. Use the manufacturer's recommended splices for maximum efficiency. Other termination can be used, but their strength loss with a particular type of rope construction should be determined and not assumed.

## **CHEMICALS** Avoid chemical exposure.

Rope is subject to damage by chemicals. Consult the manufacturer for specific chemical exposure such as solvents, acids, and alkalis. This is particularly true for natural fiber rope. Consult the manufacturer for recommendations when a rope will be used where chemical exposure (either fumes or actual contact) can occur.



## **HEAT** Avoid overheating.

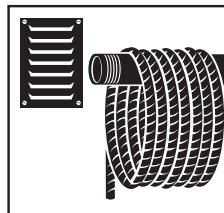
Heat can seriously affect the strength of rope. When using rope where temperatures exceed 140°F (or if it is too hot to hold), consult the manufacturer for recommendations as to the size and type of rope for the proposed continuous heat exposure conditions. When using ropes on a capstan or winch, care should be exercised to avoid surging while the capstan or winch head is rotating. The 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.

Synthetic fiber ropes will show a reduction in strength when used at elevated temperatures. Because of this property, caution should be taken when using synthetic rope at elevated temperatures, for the rope will fail under loads well below its published breaking strength. In addition, even though synthetic rope is being used at 75°F, if it has been stored at elevated temperatures over a long period of time it can fail under loads below its rated breaking strength. If the user has any doubts concerning the strength of the rope, he or she should contact the manufacturer.

**CAUTION: Heat can seriously affect the strength of synthetic ropes. The temperature at which 50% strength loss can occur in new and unused ropes is: Polypropylene - 150°F, Nylon - 350°F, Polyester - 390°F.**

## **ABRASION** Avoid all abrasive conditions.

All rope will be severely damaged if subject to rough surfaces or sharp edges. Chocks, bits, winches, drums, and other surfaces must be kept in good condition and free of burrs and rust. Pulleys must be free to rotate and should be of proper size to avoid excessive wear. Restraining clamps and similar devices will damage and weaken the rope and should be used with extreme caution.



## **STORAGE AND CARE OF ROPE**

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

Cordage should be stored in a cool, dry and well ventilated warehouse. It should be kept off the floor, on racks to provide ventilation underneath. Never store rope on a concrete or dirt floor, and under no circumstances should cordage and acid or alkalis be kept in the same building. Natural fiber rope mildews and decays if stored wet. Do not store rope in direct sunlight. Some synthetic rope (particularly polypropylene and polyethylene) may be severely weakened by prolonged exposure to ultraviolet (uv) rays unless specifically stabilized and/or pigmented to increase its uv resistance. Uv degradation is indicated by discoloration and the presence of splinters and slivers on the surface of the rope.

**WARNING: All synthetic rope under load will recoil if a fitting such as a chain, hook, cleat, bolt, pin, or ball-hitch and so forth should fail.**

The snapback action can propel the fitting and the rope causing serious injury to persons or property anywhere in the vicinity. This danger can exist from failure of the fitting within the rope's safe working load. Check all fittings, bolts, shackles, connectors, pins, mountings, splices, and so forth before using.

**The Cordage Institute publishes standards for strengths, weights and testing procedures. Send for a copy of the publications list.**