

WIRE ROPE

The general makeup of wire rope includes the core, wire, and strands. There are basically two types of wire rope, steel core and fiber core. Steel core are stands of wire wrapped around a steel core. Steel core wire rope resists crushing better than fiber core. Fiber core is wire wrapped around a fiber or synthetic center. Many specific types of wire rope are available. Separating these types of wire rope are such factors as: Strand Number, Type of Lay, Grade of Wire, Core Type, and other factors. Generally in the towing industry and rescue operations, two types of wire rope are most popular. They are the 6x19 and 6x37 Improved Plow Steel (IPS). These types of wire rope offer flexibility, durability, and strength.

WIRE ROPE CORES-

The core forms the center or heart of the wire rope, and is the center around which the main wire strands are wrapped. The core serves to support the wire strands, preventing jamming and compacting of these strands. The core material depends on the specific purpose and conditions for which the wire rope will be used.

FIBER CORE-

Fiber core wire rope is adequate for towing and rescue operations because it offers maximum flexibility, elasticity, and is lighter in weight than steel core wire rope. Fiber core wire rope isn't as strong as steel core wire rope of equal size and grade. Fiber core material is usually sisal or manila; however synthetic fibers may be used such as polypropylene.

LUBRICATION-

During manufacturing wire ropes are lubricated internally and externally. After use they should be provided special care through proper lubrication. When in use the wire rope is constantly moving and proper lubrication offers maximum life of the wire rope. Prior to lubricating the wire rope should be thoroughly cleaned with wire brushes, compressed air, steam, or a recommended solvent. Frequent light lubrication is preferred rather than infrequent heavy lubrication. Follow the wire rope manufacturer's specific recommendations when lubricating wire rope. Storage should be in a clean dry location, protected from the elements.

DESIGN FACTOR-

The design factor for wire rope slings is 5:1 while wire rope used for hoisting has a design factor of at least 3.5:1. Wire rope used in suspension has a design factor of 5:1.

WIRE ROPE INSPECTION-

All wire rope must be inspected periodically as specified by the manufacturer. Stretching of the wire rope occurs during use, as well as damage and deterioration.

1. Always wear complete personal protective clothing that meets applicable standards when working with winching operations, including inspection and maintenance.
2. Never allow the wire rope to slide through your bare, or even gloved hands. Broken strands can easily injure you.
3. Measure the wire rope's length when new as supplied by the manufacturer and record this number. Measure the wire rope's length during inspection. Consult the manufacturer for an acceptable stretch measurement and replace as necessary. Severe stretch may indicate overloading or loss of strength.
4. Measure the wire rope's diameter when new as supplied by the manufacturer and record this number. Measure the wire rope's diameter during inspection. Consult the manufacturer for an acceptable diameter reduction and replace as necessary.
5. Visually inspect the entire rope length for any sign of damage, deterioration, distortion, core protrusion, broken or cut strands or wires. The manufacturer will provide a recommendation regarding replacement depending on the number of broken wires in a rope lay or wires within a strand in a rope lay. A rope lay is the length of wire rope in which one strand makes one complete revolution around the core.
6. Inspect all fittings attached to the wire rope as specified by the manufacturer.
7. Record every inspection and maintain all records associated with inspection and maintenance.

**WORKING LOAD LIMITS
OF
WIRE ROPE**

<i>Wire Rope Diameter</i>	<i>Fiber Core</i>	<i>Steel Core</i>
3/8"	3,050#	3,280#
7/16"	4,135#	4,444#
1/2"	5,350#	5,750#
9/16"	6,750#	7,255#
5/8"	8,350#	8,975#
3/4"	11,900#	12,790#
7/8"	16,100#	17,305#
1"	20,900#	22,465#

*This information abstracted from Wreckmaster training materials for 6x19 Improved Plow Steel wire rope. This may differ from other wire rope used. **You must determine the WLL of the wire rope you are actually using for rigging purposes.***

SYNTHETIC WINCH ROPE

Some winch users are replacing wire rope with synthetic rope. There are varieties of synthetic rope and the user must determine the appropriate type to use rather than simply replace their current wire rope. Anyone using synthetic winch rope should consult the winch manufacturer and snatch block manufacturer prior to use, and follow their specific instructions. Remember; **NEVER** exceed the WLL of any rigging component. During use maintain a minimum of 7 wraps of synthetic winch rope on the drum.

Advantages of synthetic rope:

- >Lightweight
- >Flexibility
- >Floats on water
- >Minimizes potential of damage during use
- >Doesn't generally offer conductivity of electricity

Disadvantages of synthetic rope:

- >Likelihood of cuts and abrasions to the rope
- >Melting
- >UV degradation
- >Cost
- >Lack of chemical resistance

SYNTHETIC WINCH ROPE INSPECTION

Regular Wear

Characteristics	Causes
Slight 'fuzzy' look	Initial use
Slight color fading	Abrasion

Compression

Characteristics	Causes
Visible sheen	Setting of fiber around object
Stiffer than remainder of rope	Setting of fiber around object

Pulled Strand

Pulled strand protruding from remainder of rope	Snagging of rope on object
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Chemical Degradation (Retire rope!)

Fused/bonded fibers	Chemical contamination
Discoloration	Chemical contamination
Brittle fibers	Chemical contamination

Heat Degradation (Retire rope!)

Fused/melted fibers	Exposure to high heat
Very stiff	Exposure to high heat

Inconsistent Diameter (Retire Rope!)

Flat areas	Broken/pulled strands
Flat areas	Shock loading

Volume Reduction (Retire rope!)

Reduction in size of strands/rope	Abrasion
Reduction in size of strands/rope	Fatigue

Information for synthetic rope inspection obtained from BA Products advertising.