WIRE ROPE

AT A GLANCE

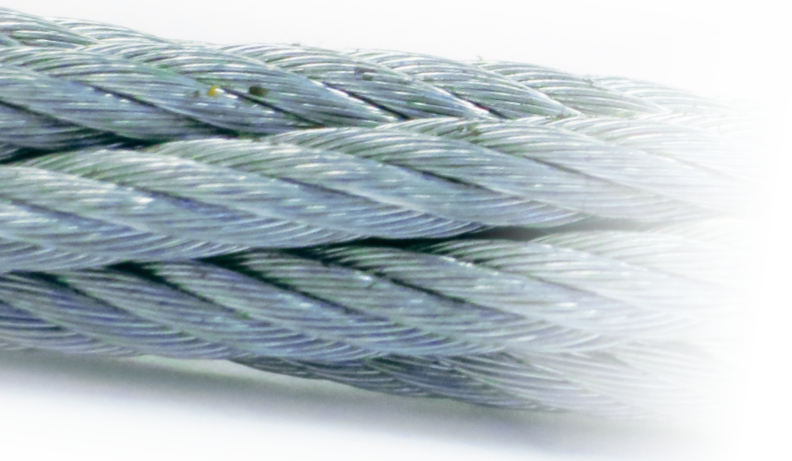
WHAT IS WIRE ROPE, EXACTLY?

Wire rope is a complex mechanical device that has many moving parts all working in tandem to help support and move an object or load. In the lifting and rigging industries, wire rope is attached to a crane or hoist and fitted with swivels, shackles, or hooks to attach to a load and move it in a controlled matter. It can also be used to lift and lower elevators, or as a means of support for suspension bridges or towers.

A wire rope is, in reality, a very complicated machine. A typical 6x25 rope has 150 wires in its strands, all of which move independently and together in a very complicated pattern around the core as the rope bends.

Wire rope is a preferred lifting device for many reasons. Its unique design consists of multiple steel wires that form individual strands laid in a helical pattern around a core. This structure provides strength, flexibility, and the ability to handle bending stresses. Different configurations of the material, wire, and strand structure will provide different benefits for the specific lifting application.







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WIRE ROPE COMPONENTS

AT A GLANCE

FOUR BASIC COMPONENTS

Wires

Wires are the smallest component of wire rope and they make up the individual strands in the rope. Wires can be made from a variety of metal materials including steel, iron, stainless steel, monel, and bronze. The wires can be manufactured in a variety of grades that relate to the strength, resistance to wear, fatigue resistance, corrosion resistance, and curve of the wire rope.

Strands

Strands of wire rope consist of two or more wires arranged and twisted in a specific arrangement. The individual strands are then laid in a helical pattern around the core of the rope. Strands made of larger diameter wires are more resistant to abrasion, while strands made of smaller diameter wires are more flexible.

Core

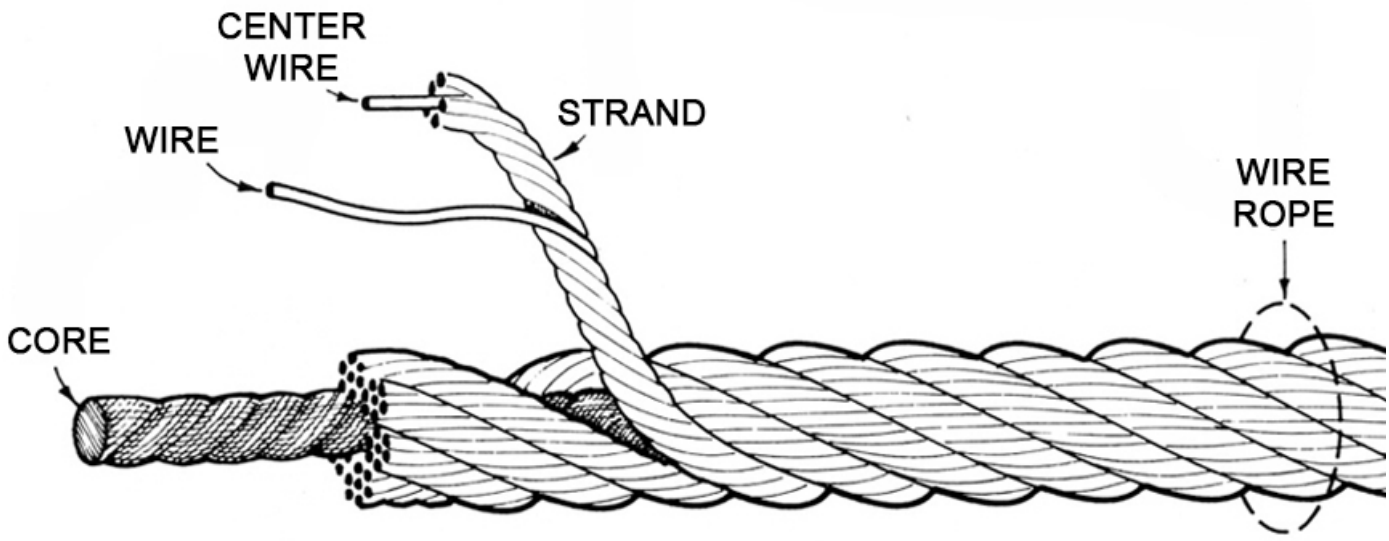
The core of a wire rope runs through the center of the rope and supports the strands and helps to maintain their relative position under loading and bending stresses. Cores can be made from a number of different materials including natural or synthetic fibers and steel.

Lubrication

Lubrication is applied during the manufacturing process and penetrates all the way to the core.

Wire rope lubrication has two primary benefits:

- Reduces friction as the individual wires and strands move over each other
- Provides corrosion protection and lubrication in the core, inside wires, and outside surface



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WIRE ROPE TYPES

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TYPES OF WIRE ROPES

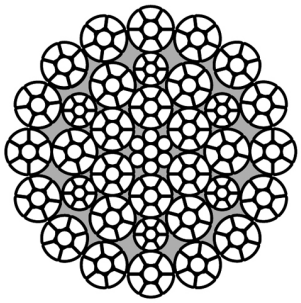
Different types of wire rope are specially designed for special lifting applications. The images below showcase different ways to construct the wires together - each with its own advantages and disadvantages for usage.

Rotation Resistant Wire Rope does exactly what it sounds like: resists twisting, spinning, and rotating.

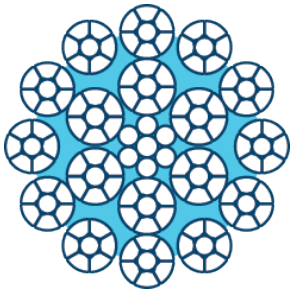
Compacted Wire Rope is created by compacting the layers to create a smoother, stronger rope.

Swaged Wire Rope is also compacted, but by using a rotary swager machine after the rope is closed. It is more resistant to crushing and it is stronger, but may be less resistant to bending fatigue.

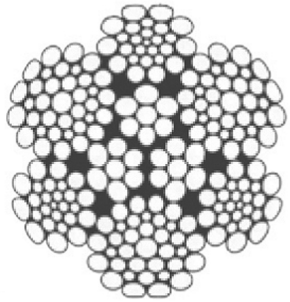
Wire rope can be **Plastic Coated** or **Plastic Impregnated**. The use of plastic as a coating is to protect against abrasion, external wear, and corrosion. Plastic impregnated wire rope has plastic on the inside of the rope to improve bending and reduce wear both internally and externally. Independent wire rope cores can be coated or filled with plastic individually before becoming part of a finished wire rope.



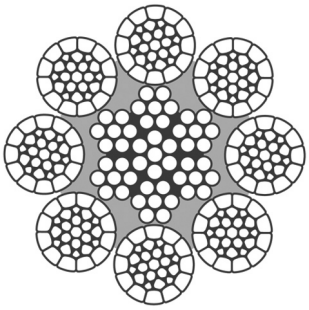
Rotation Resistant



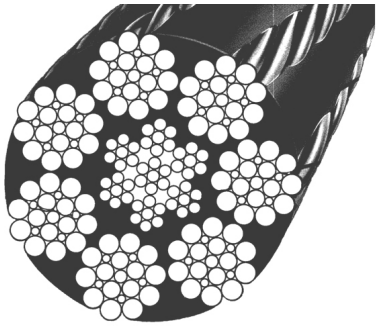
Plastic Impregnated (PI)



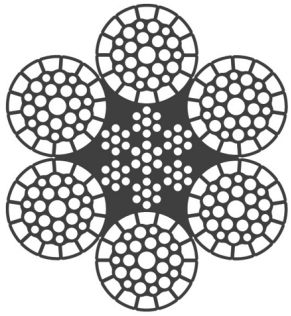
Swaged



Compact Strands



Plastic Coated



Plastic Coated or Filled Independent Wire Rope Core

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WIRE ROPE CONSTRUCTION

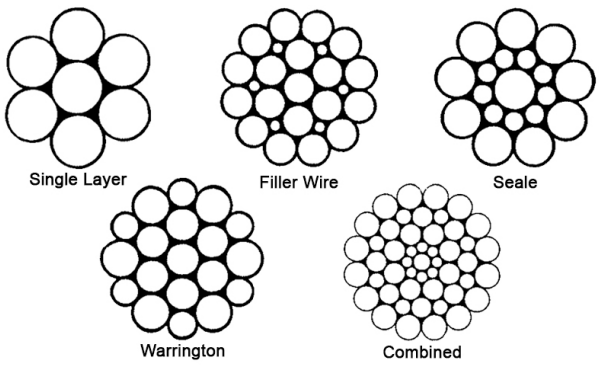
AT A GLANCE

SPECIFICATIONS FOR WIRE ROPE CONSTRUCTION

Length
The total number of feet (cut to size) when wrapped around the spool and delivered.

Size
This is the specified nominal diameter of the wire rope and can be specified in inches or millimeters.

Strand Patterns
The number of layers of wires, the number of wires per layer, and the size of the wires per layer all affect the strand pattern type. Wire rope can be constructed using one of the pictured patterns, or can be constructed using two or more of the patterns.



Strand Patterns

Preformed or Non-Preformed
On a preformed wire rope, the strands and wires are formed during the manufacturing process to the helical shape that they will take in a finished wire rope. Preformed rope can be advantageous in certain applications where it needs to spool more uniformly on a drum, needs greater flexibility, or requires more fatigue-resistance when bending.

Direction and Type of Lay
Direction and type of lay refer to the way the wires are laid to form a strand (either right or left) and how the strands are laid around the core (regular lay, lang lay, or alternate lay).



Direction and Type of Lay

(A) Right Regular Lay (B) Left Regular Lay (C) Right Lang Lay (D) Left Lang Lay (E) Right Alternative

Finish of Wires
The wires in wire rope can be zinc coated (galvanized), zinc/aluminum alloy coated (mischmetal), stainless steel, or unfinished steel (“bright”).

Grade of Rope
The strength of wire rope is broken down into different grades, including:
- Improved Plow Steel (IPS)
- Extra Improved Plow Steel (EIPS)
- Extra Extra Improved Plow Steel (EEIPS)

The plow steel strength curve forms the basis for calculating the strength of most steel rope wires.

Type of Core
Wire rope cores are designated as:
- Fiber Core (FC)
- Independent Wire Rope Core (IWRC)
- Wire Strand Core (WSC)

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WIRE ROPE SLINGS

AT A GLANCE

WHAT IS A WIRE ROPE SLING?

The unique design of a wire rope sling consists of multiple steel wires that form individual strands laid in a helical pattern around a fiber or steel core.

Wire rope slings are popular in construction, automotive, oil and gas, and general manufacturing industries where a variety of heavy loads and rugged conditions exist. They're also very popular in steel mills and forging facilities where the durability of the rope is really put to the test.

Different configurations of the material, wire, and strand structure will provide different benefits for the specific lifting application—including abrasion resistance, strength, flexibility, and fatigue resistance. Wire rope slings have a lower initial cost than alloy chain, while remaining fairly lightweight in design. Wire rope slings are available in single-leg or multi-leg assemblies and can be used in a variety of hitches including vertical, choker, and basket hitches.

SINGLE-PART VS. MAZZELLA 7-PART™

Single-part wire rope slings are traditional and constructed from multiple steel wires that form individual strands laid in a helical pattern around a fiber or steel core. The 7-Part™ wire rope sling was developed by our founder, Jim Mazzella, and is constructed from one continuous wire rope in a 7x19 construction (seven strands with 19 wires per strand). The biggest advantage of the 7-Part™ wire rope sling is that it is ultra-flexible, ergonomic, and user friendly in comparison to the single-part sling. While the 7-Part™ has a higher initial cost, it is more resistant to damage - including kinking, bending, and dog legs.



Single-Part
Wire Rope Sling



Mazzella 7-Part™
Wire Rope Sling

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