

# Wire Rope 101

## What Wire Rope Is...

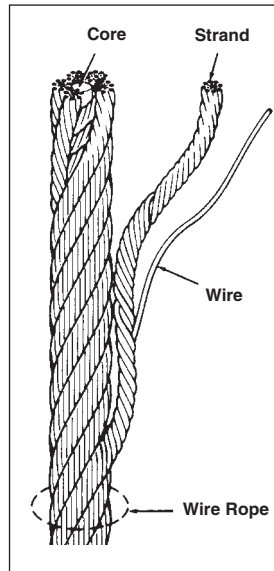
A wire rope is a piece of flexible, multi-wired, stranded machinery made of many precision parts.

Usually a wire rope consists of a core member, around which a number of multi-wired strands are "laid" or helically bent. There are two general types of cores for wire rope - fiber cores and wire cores. The fiber core may be made from natural or synthetic fibers. The wire core can be an Independent Wire Rope Core (IWRC), or a Strand Core (SC).

The purpose of the core is to provide support and maintain the position of the outer strands during operation.

Any number of multi-wired strands may be laid around the core. The most popular arrangement is six strands around the core, as this combination gives the best balance.

The number of wires per strand may vary from 3 to 91, with the majority of wire ropes falling into the 7-wire, 19-wire, or 37-wire strand categories.



## The "lays" of Wire Rope

"Lay" of a wire rope is simply a description of the way wires and strands are placed during construction. Right lay and left lay refer to the direction of strands. Right lay means that the strands pass from left to right across the rope. Left lay means just the opposite: strands pass from right to left.

Regular lay and lang lay describe the way wires are placed within each strand. Regular lay means that wires in the strands are laid opposite in direction to the lay of the strands. Lang lay means that wires are laid in the same direction as the lay of the strands.

Most of the wire rope used is right lay, regular lay. This specification has the widest range of applications and meets the requirements of most equipment. In fact, other lay specifications are considered exceptions and must be requested when ordering.



Left Lay REGULAR LAY



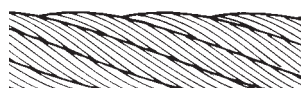
Left Lay LANG LAY



Right Alternate Lay



Right Lay REGULAR LAY



Right Lay LANG LAY

## Here are some exceptions

Lang lay is recommended for many excavating, construction, and mining applications, including draglines, hoist lines, dredgelines and other similar lines. Here's why: Lang lay ropes are more flexible than regular lay ropes. They also have greater wearing surface per wire than regular lay ropes.

Where properly recommended, installed and used, lang lay ropes can be used to greater advantage than regular lay ropes. However, lang lay ropes are more susceptible to the abuses of bending over small diameter sheaves, pinching in undersize sheave grooves, crushing when winding on drums, and failing due to excessive rotation. Left lay rope has greatest usage in oil fields on rod and tubing lines, blast hole rigs, and spuders where rotation of right lay rope would loosen couplings. The rotation of a left lay rope tightens a standard coupling.

## Wire Rope Design & Construction

Wire ropes are composed of independent parts—wires, strands and cores—that continuously interact with each other during service.

Wire rope engineers design those parts in differing steel grades, finishes and a variety of constructions to attain the best balance of strength, abrasion resistance, crush resistance, bending fatigue resistance and corrosion resistance for each application.

To select the best wire rope for each application, one must know the required performance characteristics for the job and enough about wire rope design to select the optimum combination of wire rope properties.

The following information is presented as a basic guide. Hanes Supply engineers and field service specialists are available to provide more specific recommendations.

### Strand Constructions

Strands are designed with various combinations of wires and wire sizes to produce the desired resistance to fatigue and abrasion. Generally, a small number of large wires will be more abrasion resistant and less fatigue resistant than a large number of small wires.



#### Single Size

The basic strand construction has wires of the same size wound around a center.



#### Seale

Large outer wires with the same number of smaller inner wires around a core wire. Provides excellent abrasion resistance but less fatigue resistance. When used with an IWRC, it offers excellent crush resistance over drums.



#### Filler Wire

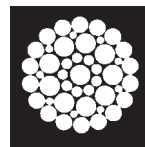
Small wires fill spaces between large wires to produce crush resistance and a good balance of strength, flexibility and resistance to abrasion.



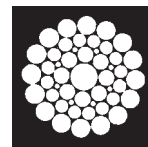
#### Warrington

Outer layer of alternately large and small wires provides good flexibility and strength but low abrasion and crush resistance.

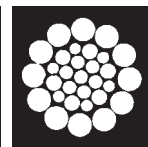
Many commonly used wire ropes use combinations of these basic constructions.



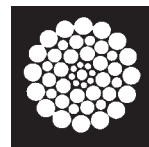
Seale Filler Wire



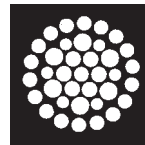
Filler Wire Seale



Warrington Seale



Seale Warrington Seale



#### Multiple Operation

One of the above strand designs may be covered with one or more layers of uniform-sized wires.

### Finish

Bright finish is suitable for most applications. Galvanized finish is available for corrosive environments. Plastic jacketing is also available on some constructions.

### Wire Grades

The most common steel wire grades are: IPS (Improved Plow Steel), EIP (Extra Improved Plow Steel) and EEIP (Extra Extra Improved Plow Steel). Stainless Steels and other special grades are provided for special applications.

Most wire ropes are made with round wires. Both triangular and shaped wires are also used for special constructions.

Generally, the higher the strength of the wire, the lower its ductility will be.