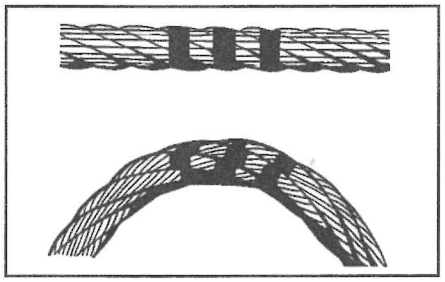
A Wire Rope Is a "Machine" With Many Moving Parts

A wire rope is a machine, by dictionary definition: "An assemblage of parts...that transmit forces, motion, and energy one to another in some predetermined manner and to some desired end."

A typical wire rope may contain dozens – even hundreds – of individual wires which are formed and fabricated to operate at close bearing tolerances to one another. When a wire rope bends, each of its many wires slides and adjusts in the bend to accommodate the difference in length between the inside and the outside of the bend. The sharper the bend, the greater the movement.

Every wire rope has three basic components: (1) The wires which form the strands and collectively provide rope strength; (2) The strands, which are laid helically around the core; and (3) The core,

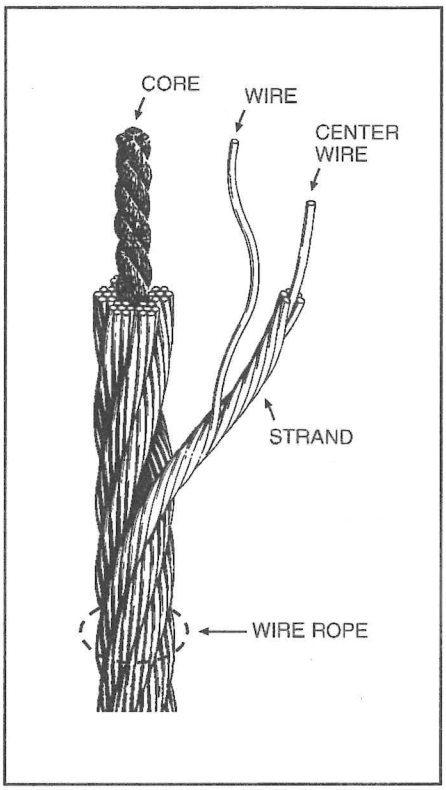


which forms a foundation for the strands. Core materials include fibers (natural or synthetic), or steel. A steel core consists of a wire strand core (WSC), Parallel Wire Rope Core (PWRC), or an Independent Wire Rope Core (IWRC).

The greatest differences in wire ropes are found in the strands, which may vary widely in the pattern and number of wires which are laid together.

The wires of a rope may be made of various metals, including steel, iron, stainless steel, monel, and bronze. The material of which the wires are made is the primary determinant of rope strength. By far the most widely used metal is high-carbon steel.

Carbon steel wire ropes come in various Grades. The term "Grade" is used to designate the Minimum Breaking Force of the wire rope. The most common rope Grades are Plow Steel (PS), Improved Plow Steel (IPS), Extra Improved Plow Steel (EIPS), and Extra Extra Improved Plow Steel (EEIPS).



One cannot determine the Grade of a wire rope by its feel or appearance. To properly evaluate a rope system, you must obtain the Grade from the wire rope supplier or rope manufacturer.

This publication was produced by the Wire Rope Technical Board,
the technical information organization of the United States wire rope industry.
For further information, contact the WRTB at 703-299-8550, wrtb@usa.net, www.wiretropetechnicalboard.org

Printed in USA