

# Wire Rope Selection

Wire rope is a machine composed of a number of precise, moving parts, designed and manufactured to bear a very definite relation to one another. In fact, some wire ropes contain more moving parts than many complicated mechanisms. For example, a 6-strand rope with 49-wire strands laid around an independent wire rope core contains a total of 343 individual wires. All of these wires must work together and move with respect to one another if the rope is to have the flexibility necessary for successful operation.

Wire rope is composed of wires, strands and a core. The basic unit of wire rope is wire, which is carefully processed and drawn from selected grades of steel to predetermined physical properties and sizes. A predetermined number of finished

wires is then helically laid together in a uniform geometric pattern to form a strand. This process must be performed with precision and exactness to form a strand of correct size and characteristics. The required number of suitably fabricated strands are laid symmetrically with a definite length of lay around a core, forming the finished wire rope.

## Wire Rope Construction

Wire rope is identified by its construction, or the number of strands per rope, and number of wires in each strand. For example, the construction 6x25 denotes a 6-strand rope, with each strand having 25 wires. Constructions having similar weights and breaking strengths are grouped into wire rope classifications, such as the 6x19 and 6x37 Classes.

## Wire Rope Finish

The term *bright* refers to a wire rope manufactured with no protective coating or finish other than lubricant. Some applications do require more corrosion protection than lubricant can provide. In these instances, a galvanized finish is provided. Consult with DCL's sales department for more information on galvanized wire rope.

## Wire Grade

**Improved plow steel** is a strong, tough, durable steel that combines great strength with high resistance to fatigue. Its minimum tensile strength varies from 223 to 258 ksi, depending upon wire diameter.

**Extra Improved Plow (EIP)**, was once a specialty grade. But, is now a grade typical for all standard wire rope. Minimum tensile strength varies from 245 to 284 ksi, depending upon wire diameter.

**Extra Extra Improved Plow (EEIP) steel**, is a grade used where a high breaking strength is required. This grade typically provides a breaking strength a minimum of 10% higher than EEIP and is found primarily as a standard grade for specialized wire rope. However, EEIP is available for standard wire ropes upon request.

Developed by WW for the federal government, **Royal Purple Plus** is the highest strength grade available to Bethlehem Wire Rope customers. **Royal Purple Plus** provides a breaking strength 35% higher than Purple Plus, and is available in WW's TRIPLE-PAC hoist rope.

It is the grade of wire which determines the nominal breaking strength for each diameter and construction. **Note**, the acceptance strength listed in the various tables for Bethlehem Wire Rope products is 2-½% below the nominal strengths listed.

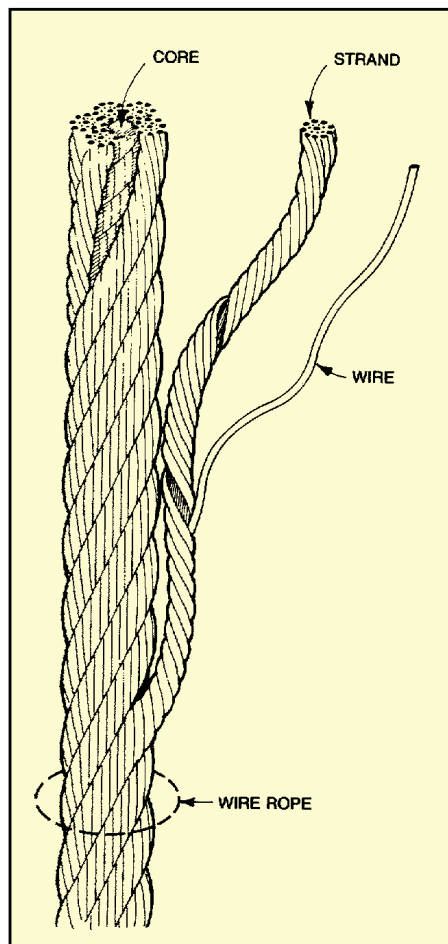
Other grades are available to meet specific requirements. Some grades are covered by wire rope standards while others may be specially tailored. Consult DCL's department for further information.

## Wire Rope Lay

The helix or spiral of the wires and strands in a rope is called the lay.

**Regular lay** denotes rope in which the wires are twisted in one direction, and the strands in the opposite direction to form the rope. The wires appear to run roughly parallel to the center line of the rope. Due to the difference in direction between the wires and strand, regular lay ropes are less likely to untwist or kink. Regular lay ropes are also less subject to failure from crushing and distortion because of the shorter length of exposed outer wires.

## Three Components of Wire Rope



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**Lang lay** is the opposite; the wires and strands spiral in the same direction and appear to run at a diagonal to the center line of the rope. Due to the longer length of exposed outer wires, Lang lay ropes have greater flexibility and abrasion resistance than do regular lay ropes. Greater care, however, must be exercised in handling and spooling Lang lay ropes. These ropes are more likely to twist, kink and crush than regular lay ropes.

**Right or left lay** refers to the direction in which the strands rotate around the wire rope. If the strands rotate around the rope in a clockwise direction (as the threads do in a right hand bolt), the rope is said to be right lay. When the strands rotate in a counterclockwise direction (as the threads do in a left hand bolt), the rope is left lay.

**Right regular lay is furnished for all rope applications unless otherwise specified.**

When a lay-length is used as a unit of measure, it refers to the linear distance a single strand extends in making one complete turn around the rope. Lay-length is measured in a straight line parallel to the center line of the rope, not by following the path of the strand. The appropriate time to replace a wire rope in service is frequently determined by counting the number of broken wires in the length of one rope lay.

## Preformed Wire Rope

Preformed wire rope means that the wires and strands have been preset

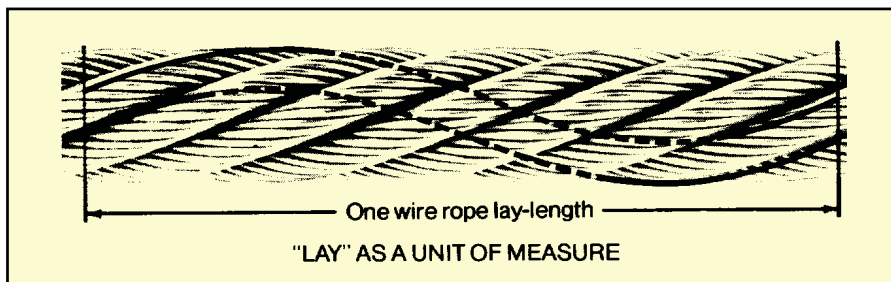
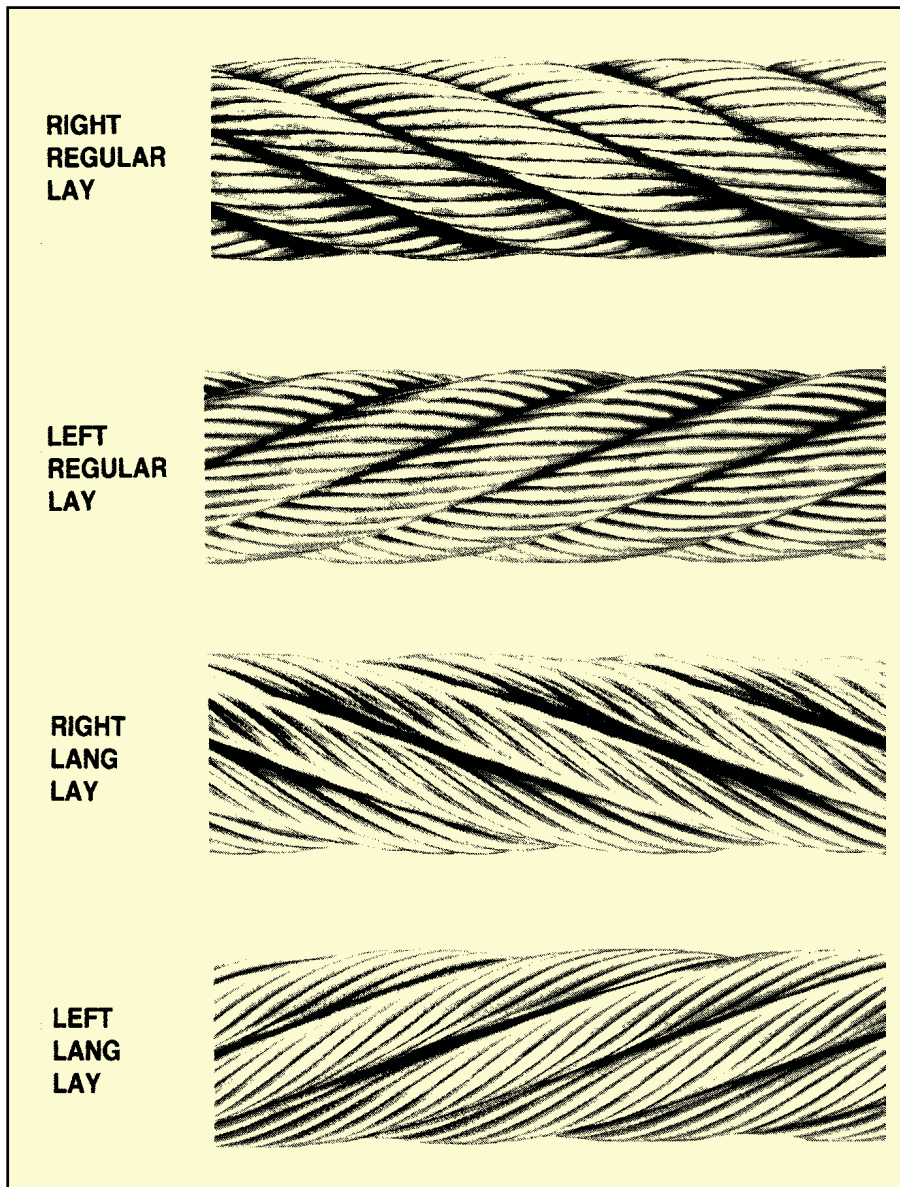
during manufacture into the permanent helical form they take in the completed rope.

**Unless otherwise specified, Wire Rope is typically furnished preformed.**

Preformed wire rope has definite characteristics which are advantageous on most wire rope

applications. Preforming greatly reduces internal stresses, eases rope handling, and gives more equal distribution of load on the wires and strands. Preformed rope runs smoother and spools more uniformly on a drum than non-preformed, has greater flexibility and gives longer service life in bending.

Preformed wires tend to remain in position after breaking. This reduces the tendency for them to protrude and damage adjacent wires. Because the wires do not protrude, we strongly suggest greater care and more thorough inspection to detect broken wires in a preformed wire rope.



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