

## What Is Wire Rope?

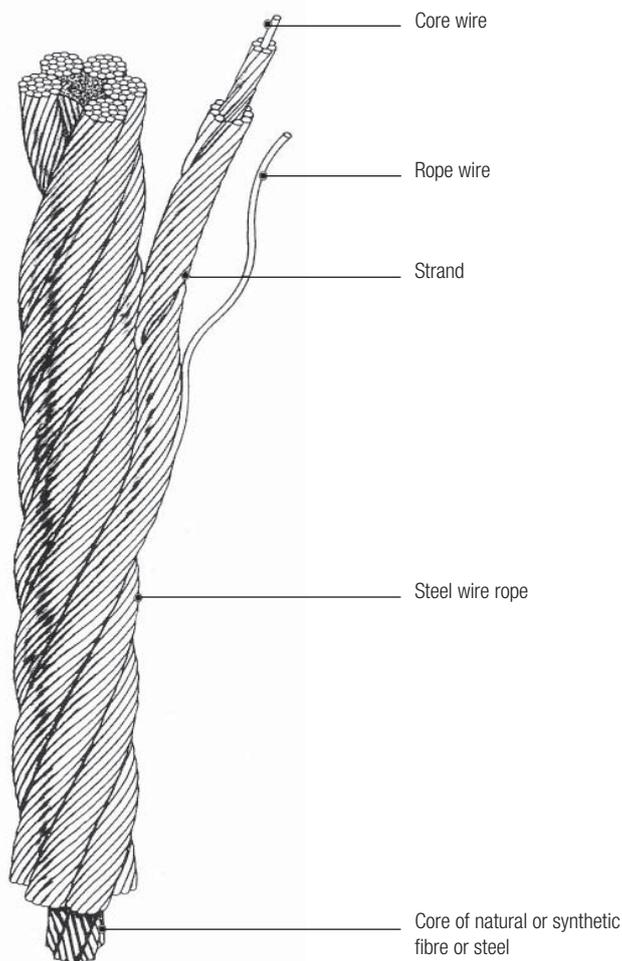
A wire rope consists of steel wires, in groups of between 6 and 60 or more, twisted together into strands. The strands, numbering between 3 and 8 in simple constructions, are, in turn, twisted together around the core.

The steel wire is drawn from rod of diameters between 5 and 10mm to wire of the exact diameter found to give the best performance in the rope to be made.

Most specifications for wire ropes stipulate outside diameter tolerance of +4% and -1 %, so with upwards of 100 wires per rope the tolerance on each wire is, in effect, very small.

As the wire diameter is reduced by drawing through progressively smaller tungsten Carbide Dies, the tensile strength is raised by cold working, so that by varying the number and sizes of dies, a wire can be produced with the correct diameter, with a tensile strength ranging from 140 kgf/mm<sup>2</sup> to upwards of 220 kgf/mm<sup>2</sup>, and with the required characteristics of hardness and flexibility. The wires can be galvanised or left uncoated.

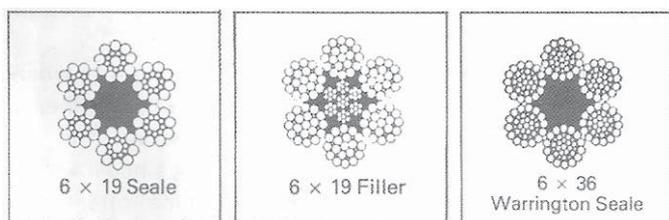
This account is, of course, simplified. In practice many variables are introduced and the number, size and arrangement of wires in the strand, and of strands in the rope (i.e. the "construction" of the rope) varies according to the rope specification, to give varying degrees of strength, flexibility, resistance to abrasion, heat, crushing, shock loading etc.



## Strand Construction

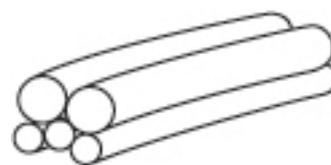
Each strand in a steel wire rope consists of one or more layers of wire laid in a spiral round a centre or "king" wire (except some marine ropes, in which the centre is of fibre). The simplest construction consists of one layer of 6 wires of equal diameter round a king wire, while others may consist of up to 4 or more layers of wire.

Constructions of steel wire rope are expressed in simple numerical forms showing the number of strands x number of wires per strand and further simplified by being grouped into "families" known, for example, as the "6 x 19 Group" (all of which have 6 strands of between 15 and 25 wires) and "6 x 36 Group" (6 strands of between 26 and 41 wires).



Every time a wire rope bends each wire moves slightly in relation to its neighbours, therefore the sizes and dispositions of the wires are very important to the performance and life of the rope. One distinction can clearly be drawn here between two different types of strand construction - Equal Lay and Cross Lay.

**Equal Lay** - all layers of wire are in spirals of the same pitch, so that each wire supports or is supported by its neighbours throughout its length. These constructions are more compact, therefore have a higher density of steel than a cross lay, so the strand is not easily crushed out of shape and the wires do not have points of relatively high contact pressure.



**Cross Lay** - successively layers are not in the same pitch, so that the wires of one layer will cross over wires in the layer below. Although many cross lay constructions have the advantage that all the wires may be of the same diameter, the wires are not as well supported as in equal lay ropes, and damage at the points where wires in two layers cross may reduce rope life.

