Draka

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Rope classification vs. rope construction

TECH TIP 9

What is the difference between wire rope *classification* and wire rope *construction*? It seems that there is some confusion between the two terms in the field. Let's take a moment to see how these terms are used to exactly define a wire rope.

Classification and construction defined

There are mainly two classifications for elevator wire rope. They are:

6x19 classification – these are ropes consisting of 6 strands with anywhere from 15 to 26 wires in each strand.

8x19 classification– these are ropes consisting of 8 strands with anywhere from 15 to 26 wires in each strand.

However, the description of rope construction is a bit more complex (and accurate) and consists of the following:

Rope diameter – in fractions of an inch or millimeters.

The number of strands – 6 or 8 – and number of wires in each strand – 19, 21 or 25.

Rope type – Seale, Warrington or Filler Wire (see the diagrams in Table 1).

Rope lay – Right Regular Lay or Right Lang Lay (Right Regular Lay is the standard lay and is provided unless Lang is specified - virtually all modern elevator ropes are Right Lay).

Surface of the wires – bright or galvanized (bright is the standard unless galvanized is specified).

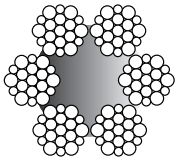
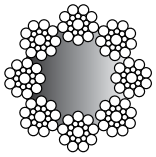
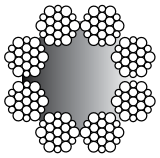
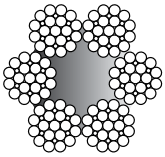
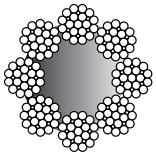
Rope grade – Iron, Traction or EHS (Extra High Strength) Traction.

Preforming – Preformed rope is the standard.

Rope core – Natural Fiber Core (e.g. sisal), Synthetic Fiber Core (e.g. polypropylene), Independent Wire Rope Core (IWRC) or Mixed Core (e.g. steel-reinforced natural fiber).

As you can see, classification is only a simple way of describing a rope. A full description of the construction is the only way to correctly specify a wire rope.

Table 1: Cross-sections of common wire rope constructions with natural fiber core

6x19 constructions		8x19 constructions	
			
6x19 Warrington		8x19 Seale	8x19 Warrington
			
6x25 Filler Wire		8x25 Filler Wire	

Rope Classification: a Brief History

Elevator wire rope evolved from the ropes used by the logging industry in the 19th century to drag trees straight to a staging area. (To be convenient to loggers, most wire rope manufacturers were located on the rivers that were used to transport the cut timber.) The most popular ropes were constructions of six strands consisting of 19 wires, simply called 6x19 rope. This style of rope was very resistant to abrasion but not very flexible.

Later on, pulleys and sheaves were used to change the direction of the ropes as the trees were being pulled through the woods. This increased amount of bending under load caused the 6x19 rope to fail faster than when it was used to pull logs in a straight line. Rope manufacturers improved the 6x19 design by adding smaller wires that filled the gaps between the larger diameter wires. These "filler wires" increased the wire count to 25. What these 6x25 ropes lost in abrasion resistance was more than made up for in fatigue resistance.

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Appropriately, the modified logging rope was called 6x25 Filler Wire, which is the number of strands, number of wires and type, or the actual design specification of the rope. However, both 6x19 and 6x25 ropes (as well any ropes with 6 strands and a count from 15 to 26 wires per strand) were classified as 6x19 ropes.

As you can see, an order for a "6x19 wire rope" does not give the rope supplier any idea of the actual rope design specification. For example, a 6x19 Warrington and the more current 6x25 Filler Wire are both 6x19 classifications but have very different design specifications.

Wire rope construction evolved to serve different needs. As buildings became taller, the eight-strand rope was developed for use on elevators. Eight-strand rope is more flexible than six-strand rope while still providing good abrasion resistance. An 8x19 classification came into existence which, like the 6x19 classification, includes wire counts ranging from 15 to 26 wires. Note that in some extremely tall buildings, six-strand ropes have been employed to reduce overall stretch.

Now that you know the difference between classification and construction, you can see that calling in an order for an "8x19 wire rope" does not give all the needed information. For example, the Draka EP staff has been trained to ask what this 8x19 rope is being used for. If it's a hoist rope, a Seale construction type is indicated. If the 8x19 rope is being used as a governor rope, it's probably a Warrington or Filler Wire type. Compensation ropes are almost always Filler Wire.

See Table 2 for a listing of different elevator configurations and suggested rope types.

This gives you a brief explanation of classifications as well as a reason to carefully review your rope orders so that a proper description of the construction can be provided. Giving the full specification helps eliminate confusion in the ordering process as well as the costly problem of installing the wrong ropes and then having to replace them.

Table 2: Elevator configurations and ropes with natural fiber core

Single wrap traction/overhead machine		
Hoist	8 x 19 Seale 6 x 25 Filler Wire	Traction or EHS Traction or EHS
Compensation	8 x 25 Filler Wire	Traction or Iron
Governor	8 x 25 Filler Wire* 6 x 25 Filler Wire	Traction or Iron Iron
1:1 double wrap traction/overhead machine		
Hoist	8 x 19 Seale 6 x 25 Filler Wire	Traction or EHS Traction or EHS
Compensation	8 x 25 Filler Wire	Traction or Iron
Governor	8 x 25 Filler Wire* 6 x 25 Filler Wire	Traction or Iron Iron
2:1 double wrap traction/overhead machine		
Hoist	8 x 19 Seale 6 x 25 Filler Wire	Traction or EHS Traction or EHS
Compensation	8 x 25 Filler Wire 6 x 25 Filler Wire	Traction or Iron Iron
Governor	8 x 25 Filler Wire*	Traction or Iron
Single wrap traction/basement machine		
Hoist	8 x 19 Seale 8 x 21 Filler Wire	Traction or EHS Traction or EHS
Governor	8 x 25 Filler Wire* 6 x 25 Filler Wire	Traction or Iron Iron

* Use 8 x 19 Warrington for 7/16" and 3/8" diameter rope

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