How to correctly order wire rope

TECH TIP 4

ORDERING HOIST ROPES

The information needed to order hoist ropes is:

- the number (quantity), length and diameter of the ropes;
- their stranding, construction and lay;
- their grade or tensile strength;
- and their breaking load.

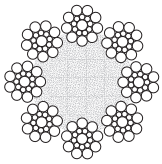
While this information may be provided on the wire rope tag, it should be noted that the tag information may not always be accurate. For instance, it is not uncommon to find that the wrong tag has been applied. Use the following procedure for ordering hoist ropes for a traction elevator:

Step 1: Count the number of ropes on the elevator.

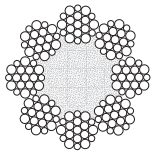
Step 2: Determine the length of each rope. The length can often be found on the installation layout.

Step 3: Measure the diameter of the rope. If you don't have a measuring tool, the crosshead data plate on top of the car should show the diameter or the diameter may be stamped on the existing shackles.

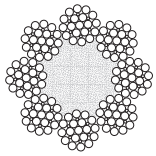
Step 4: Determine the stranding and construction of the rope. Stranding is the number of strands per rope and the number of wires per strand (e.g. an 8-strand rope with 19 wires per strand has 8 x 19 stranding). Determine whether the rope has 6, 8 or 9 strands by looking at the shackles where the stranding is more easily seen. The rope construction (Seale, Warrington, Filler Wire, etc.) can be found by matching up the rope cross-section with these diagrams:



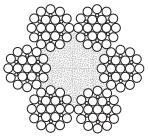
8 x19 Seale



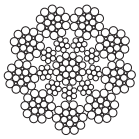
8 x 19 Warrington



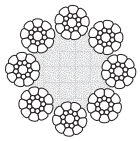
8 x 25 Filler Wire



6 x 25 Filler Wire



9 x 21 Filler Wire



8x19 Seale Compacted

A 6-strand hoist rope is usually 6 x 25 Filler Wire construction with Right Regular lay. If there is not a crosshead data plate and the building is over 50 years old, the ropes used are usually 6 x 25 Filler Wire with Right Regular lay.

An 8-strand hoist rope is usually 8 x 19 Seale. Lay can vary (see Step 5 below).

Step 5: Determine the lay of the rope. Compare a Right Regular lay rope to a Right Lang lay rope:

Right Regular

Right Lang

Note that the orientation of the individual wires is parallel to the centerline in a Right Regular lay rope. Right Regular lay is assumed if the lay is not indicated on your order.

Step 6: Determine the grade or tensile strength of the rope. Grades are Iron, Traction or Extra High Strength Traction (EHST).

Iron rope is normally used for governor and compensating ropes.

Traction rope can also be used for hoist, governor and compensating applications.

Extra High Strength Traction (EHST) rope is frequently specified for high-rise/high-speed hoisting conditions.

Grade is sometimes expressed as tensile strength in Newtons/square millimeter (N/mm^2) or pounds/square inch (psi) - see Table 1.

Table 1

MINIMUM WIRE TENSILE STRENGTHS FOR ROPE GRADES

Rope Grade	Tensile Strength of Outer Wires N/mm^2 • psi
Iron	680 • 100,000
Traction	1180 • 170,000
EHS Traction	1670 • 245,000

Step 7: Determine the breaking load, which can aid in confirming the grade and is usually indicated on the crosshead data plate. For example, if a breaking load of 14,500 lbs • 64,500 N is indicated for 1/2 in • 12.7 mm 8 x 19 ropes, refer to the information in the Draka EHC catalog or call your Draka Elevator representative for the correct grade (in this case, traction grade).

Draka EHC

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How to correctly order wire rope (cont'd)

OTHER FACTORS IN ORDERING HOIST ROPES

Core: The purpose of the core is to provide support for the strands. Natural fiber is the most common core used in elevator ropes in North America. However, in some high-rise/high-speed, most MRL and certain hydraulic applications, the use of steel-reinforced natural fiber or full steel core (IWRC) ropes is becoming more common.

Preforming: In the preforming process, the strands are formed into a helix (spiral) prior to closing. Preformed rope is the industry standard and provides longer rope service life while being easier to handle. All Gustav Wolf ropes sold by Draka EHC in North America are preformed.

Coating: Bright (uncoated) is the industry standard and comes without any coating on the wires other than lubrication. For protection from weather and corrosion (e.g. outdoor and mine elevators), the use of a galvanized coating is often recommended.

Stretch: Elevator wire rope stretch results from two main factors;

> **Elastic stretch** is an increase in rope length due to increase in load (as load increases, the rope becomes longer and narrower and vice versa).
>
> **Constructional stretch** is an increase in rope length due to the settling/compression of the core and strands when a load is applied (most occurs shortly after the rope is put into service).

Ropes made by different manufacturers and ropes of different strandings, constructions, grades, etc. exhibit different stretch characteristics.

Prestretching: Some wire rope manufacturers promote pre-stretched rope at a premium price. Laboratory testing has shown that standard Gustav Wolf natural fiber core rope exhibits comparable elongation to commonly used brands of pre-stretched natural fiber core rope without the associated increase in price.

Compacting: Compacted strands increase bending resistance. The larger contact area between ropes and sheaves reduces surface pressure and helps extend short rope service life associated with rope fatigue due to reverse bends e.g. basement machines. CompactTrac™ (see diagram page 1) made by Gustav Wolf is an eight-strand/Seale rope with compacted strands. It is a Right Lang lay rope in Traction grade.

ORDERING GOVERNOR AND/OR COMPENSATING ROPES

The ordering procedure is similar to hoist ropes but you may have to rely on the rope tag to a greater degree because there is no crosshead data plate for governor or compensating ropes.

Step 1: Measure the diameter of the ropes. Use a caliper, micrometer or Go/No Go gauge. When using a caliper to measure wire rope, measure from crown to crown and not from valley to valley.

Step 2: Go to the shackles and confirm the stranding (6 or 8) of the ropes. Almost all compensating and governor ropes have 8 strands. Look at the rope tag to determine breaking load and then refer to the information in the Draka EHC catalog for the correct grade (Iron or Traction).

Step 3: Consider the rope grade or tensile strength. Governor and compensating ropes are either Iron or Traction - never Extra High Strength Traction (EHST).

Step 4: Confirm the lay. The lay of governor and compensating ropes is always Right Regular and never Right Lang.

OTHER FACTORS IN ORDERING GOVERNOR/ COMPENSATION ROPES

Preformed rope is always preferred for its longer life and ease of installation.

Replace all governor and compensating ropes with preformed ropes.

See Table 2 for minimum breaking strengths for typical wire rope sizes and grades (from ASME A17.6 Table I-1.1-2)

Table 2

MINIMUM BREAKING STRENGTHS FOR WIRE ROPE GRADES (8X19 WITH FIBER CORES)

Rope Diameter inches • mm	Iron lbs	Traction lbs	EHS Traction lbs
1/4 • 6.4	1,800	3,600	4,500
3/8 • 9.5	4,200	8,200	9,900
1/2 • 12.7	7,200	14,500	17,500
9/16 • 14.3	9,200	18,500	21,100
5/8 • 15.9	11,200	23,000	22,100
11/16 • 17.5	13,400	27,000	32,800
3/4 • 19.1	16,000	32,000	38,900

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