برنتن وايـر روبـس ش م ح

Brunton Wire Ropes FZCo.

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an usha martin Group company

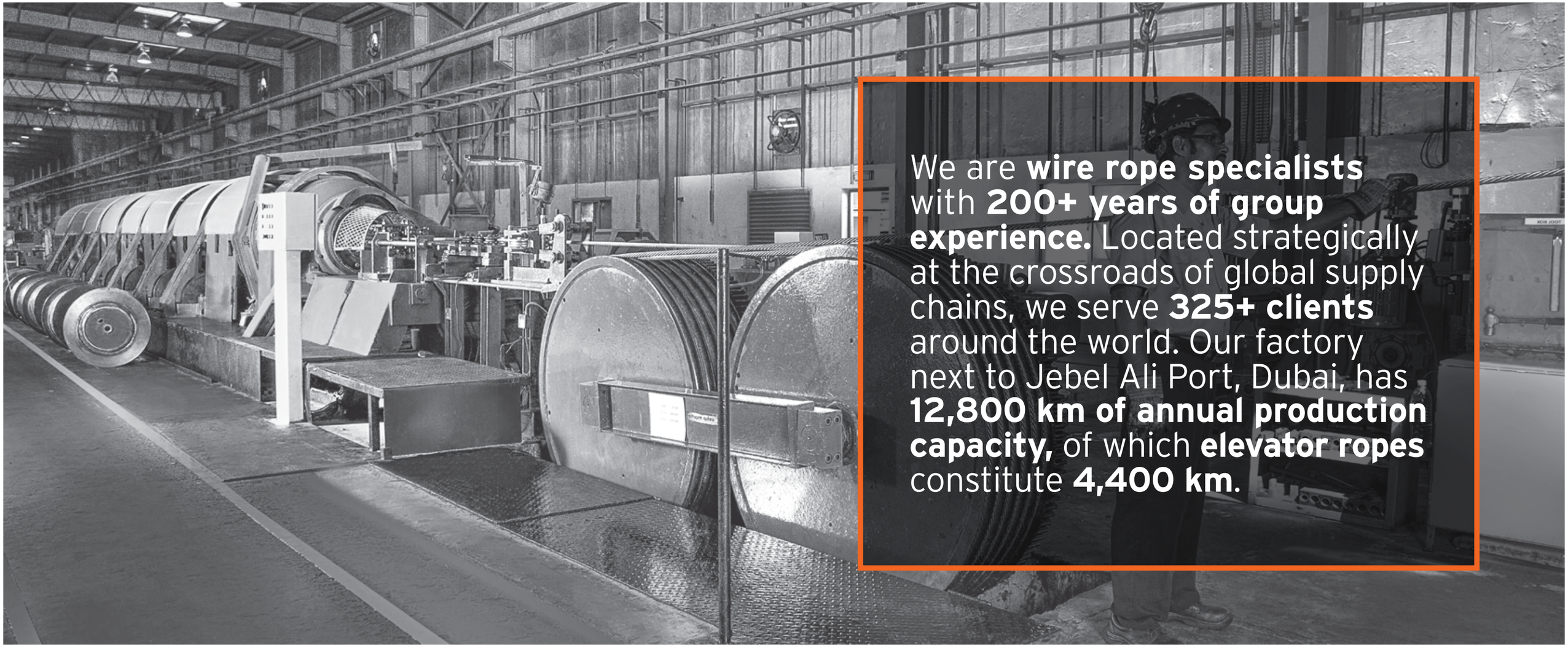
www.bruntonwire.com

Designed & produced by Headliners

برنتن وايـر روبـس ش م ح

Brunton Wire Ropes FZCo.

BRUNTON WIRE ROPES
THE SPECIALIST



We are **wire rope specialists** with **200+ years of group experience.** Located strategically at the crossroads of global supply chains, we serve **325+ clients** around the world. Our factory next to Jebel Ali Port, Dubai, has **12,800 km of annual production capacity,** of which **elevator ropes** constitute **4,400 km**.

MEET THE WIRE ROPE SPECIALIST

Brunton Wire Ropes FZCo. is a rope specialist manufacturing steel wire ropes in the Jebel Ali Free Zone, Dubai from the year 2003. It is one of the 5 global plants that the billion-dollar Rope & Specialty steel giant Usha Martin Group has and is one of the best in the world.

Backed by more than 200 years of group experience in evolving advanced rope designs, we have an elaborate manufacturing base globally, possess state-of-the-art machines, and rich experience in negotiating dynamic market forces; making us a 'Real Solution Provider' in the markets we serve.

Brunton Wire Ropes is proud to have its products sold consistently in more than 31 countries in Europe, North America, South America, North Asia, Australia, Africa, and the Middle East & South East Asia. Our plant in Dubai produces & supplies steel wire ropes for Oil & Gas, Crane, General Engineering, Fishing, Dredging, Mining, and Elevator applications, having a very wide diameter range between 3mm and 77mm. Our ability to produce and sell new generation ropes like compacted & plasticated ropes has helped our clients to get a complete solution from a single plant. Elaborate testing facilities from raw material to final product give our products a qualitative edge over many competitors, thus retaining the confidence of many major oil giants, mining groups, oil rigging companies, and elevator OEMs. The Dubai plant is QMS certified and also holds Lloyds & API (American Petroleum Institute) certifications. As a result, Brunton Wire Ropes has grown more than 300% in 15 years. Extensive inventory planning, clubbed with a crucial logistical advantage, and supported by a large efficient port, have helped Brunton Wire Ropes' clients to get swift deliveries anywhere in the world.

The group's R&D is continuously helping Brunton Wire Ropes offer new designs to the clients, thereby, gaining technological leadership. In short, the backward integration model of the Usha Martin Group, in resonance with the quality excellence datum, and aided by the experienced executive leadership, have made Brunton Wire Ropes FZCo., to be a name that spells enormous reliability to all sections of wire rope clients all around the globe.

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9A-0070

Intertek

UKAS MANAGEMENT SYSTEMS
014

CUSTOMER SPREAD

THE CUSTOMERS WE SERVE

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THE MOST RELIABLE ELEVATOR ROPES

No other application of steel wire ropes demands as close manufacturing tolerances, as exacting safety standards, and as high quality in materials as the elevator industry.

Brunton Wire Ropes is always striving to improve on these standards and offer a complete range of elevator/lift ropes. These ropes are designed to satisfy most OEM specifications and are available for main suspension, governor and compensating duties.

We not only act as suppliers but also work closely with our customers in their endeavour to deliver the highest quality standards, better durability and longer service life.

Fatigue tests and on load tests on our ropes have demonstrated that they are far superior than the comparative industry standards.

We operate a Quality System in accordance with ISO 9001 and have complete control of the manufacturing process from wire to the finished rope. Today, the group is actively working with OEMs like Otis, Schindler, Kone, Thyssen Krupp, Mitsubishi, Fujitec, etc., for a wide range of elevator models that each one of them manufactures.

In addition to having contracts with OEMs in many countries, our elevator ropes are popular with big elevator service companies throughout the world. Our capacity to cater to all their needs with a wide range of ropes in various constructions and cores has made this whole group a very popular choice for OEMs and service companies.

Furthermore, we take pride in having wide logistics infrastructure with ample warehousing and inventory around the world, and are also supported by a robust dealer network. Additionally, we also have the experience of serving our customers with cut-to-length elevator ropes for distribution to different sites.




ACCREDITATION

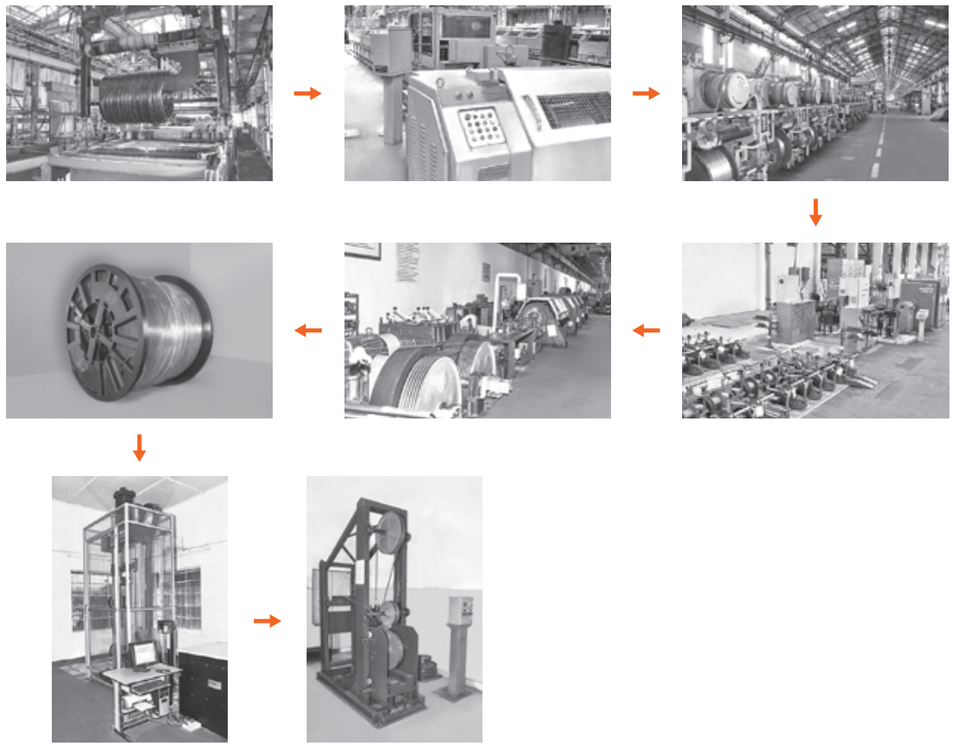
Quality comes first. Our ropes undergo tough quality tests, including endurance testing and on line magnetic evaluation to ensure that only those products which satisfy stringent quality testing are allowed to reach our customers. Our production and quality systems are designed and managed in accordance with our Quality Management System administrated by ISO 9001: 2015, ISO 14001: 2015, ISO 45001: 2018, Lloyd's, and API-9A.

MANUFACTURING PROCESS

Manufacturing Machines

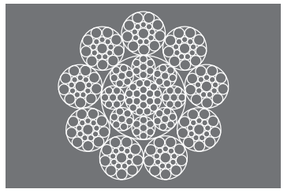
Some of our manufacturing machines:

- State-of-the-art Pickling (cleaning & coating) plant
- Patenting furnaces employing latest technology
- Sophisticated die shop
- A number of wire drawing machines fitted with customised control mechanism
- Stranding and closing machines of varying type & size, each having latest technology and excellent control systems



Product Design

The prerequisite for a good rope is good design. Our ropes are designed using a highly effective and specialised rope design system using insights and expertise that have evolved over decades. This system combined with years of experience ensures that every rope design is optimised to its performance requirements.



Raw Material Quality

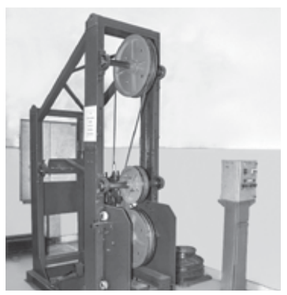
Good raw material quality is the foundation of high quality in the finished rope. Brunton Wire Ropes is fully backward integrated, having its own contracted supply of steel. At Brunton, steel for elevator wire ropes is tailor-made to achieve the highest levels of cleanliness, strength, ductility and endurance.

Latest Machinery

Besides rope design and good raw material quality, production equipment influences product quality the most. We have in-house machine design and manufacturing facilities which ensure that we have customised equipment that incorporates the latest developments in manufacturing technology.

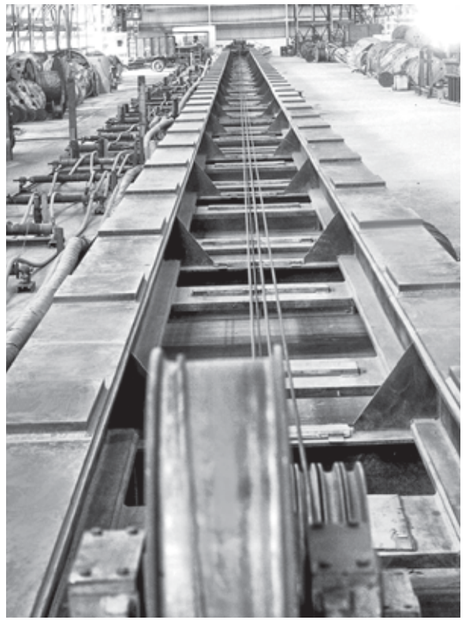
Bending Fatigue Appraisal

Bending fatigue resistance is the ability of the wire rope to withstand repeated bending over drum / pulley under constant or fluctuating load. Our ropes undergo a 'comprehensive fatigue testing program' which has been devised not only to ensure that our ropes consistently deliver performance but also to provide information for product improvement and development.



Pre-stretching

It is a specialized process opted for removing the constructional stretch (a permanent stretch which occurs shortly after the elevator rope is installed) from the wire rope. Our pre-stretched ropes are processed off-line, on a specially designed P/S bed, utilising a longer length of rope and subjecting it to suitable load for sufficient number of cycles until it stabilises. This process has been found to be the most effective in reducing the constructional stretch of a wire rope and is much superior to on-line pre-stretching.



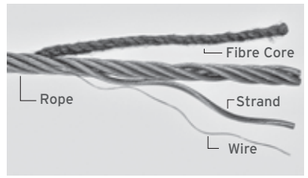
Pre-stretching unit

Optimum Performance and Consistency

A simple way to ensure performance and consistency is to make sure that you are using Brunton Wire Ropes.

Unique identification tag

DEFINITION & CLASSIFICATION

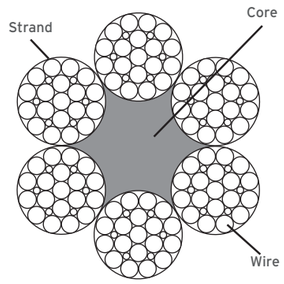


A wire rope is an intricate device, a composite structure, made up of a number of individual units, called wires, which are designed and produced in such a manner that they always exist and work in some precise relationship with one another. This precise relationship of individual wires, which possess certain defined physical and mechanical characteristics, ensures that the composite wire rope has strength, flexibility and durability essential for safe hoisting applications. Although other elements and factors are significant to the successful operation of wire ropes in elevators, the user must understand the fundamentals of wire ropes; this will help them specify and procure the correct wire rope to suit their application.

Wire Rope Construction

A Wire rope has three main elements:

- Wire
- Strand
- Core



Wire

The basic component of a wire rope is the wire, which is made from steel in various sizes. The number of wires in a strand varies depending upon the usage of the wire rope. A defined number of wires are spun helically around a central wire to form a strand. A number of such strands are then helically spun together over a core to form a wire rope. The way the wires are spun to form the strands and the way these strands are spun around the core greatly contribute to the overall performance characteristics of the wire rope.

Surface Finish

An elevator wire rope may have wires in either bright finish, which refers to a wire, which has no additional metallic coating to resist corrosion; or in galvanised finish, which means that the wire has a coating of zinc. Elevator wire ropes are generally procured in bright finish and seldom as galvanised, but the latter may be procured on demand.

Tensile Grade

The tensile grade of a wire rope refers to the tensile designation of its constituent wires. For example, in 1/2" 8x19S Dual or 9.5mm 8x19W 1570, the expressions Dual and 1570 refer to the tensile strength of its constituent wires. A dual tensile grade normally implies that outer wires are of lower tensile and inner wires are of higher tensile, for example 1180/1770 or 1370/1770.

Note: Standards such as ISO 4344 and EN 12385-5 refer these tensile designations in place of iron, traction and EHS grade, which are commonly used in the United States. 1180/1770 or 1370/1770 grade may be used in place of traction ropes and 1570/1770 or 1670/1960 grade in place of EHS ropes. The iron grade has no equivalent in these international standards as its lower tensile strength has generally made it obsolete in most hoisting applications. While some older equipment may still specify iron grade for governor rope applications, most newer equipment is using 1180/1770 grade material.

Strand

The geometrical arrangement of wires in the strand is called its construction. The most common strand constructions are Seale, Warrington and Filler (Filler Wire.)

Seale

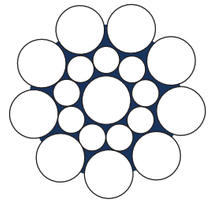
Seale has larger diameter of wires on the outer layer to resist abrasion and has an equal number of smaller wires on the inner layer to provide flexibility.

Warrington

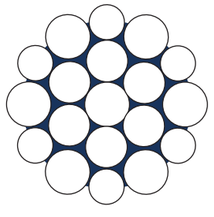
Warrington has an alternative arrangement of smaller and larger wires on the outer layer to combine flexibility with abrasive properties.

Filler (Filler Wire)

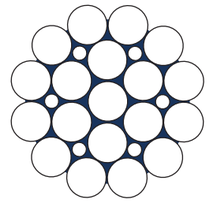
Filler Wire has smaller wires filling the empty spaces between the outer and inner wire layer and offers better fatigue properties along with good abrasion resistance.



Seale



Warrington



Filler (Filler Wire)

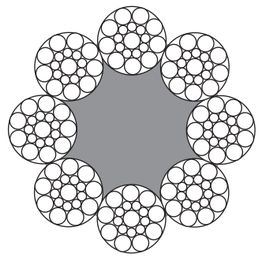
Core

It is the core which provides support to the outer strands and offers integrity to a wire rope. A wire rope can have a steel core (wire strand core – WSC or independent wire rope core – IWRC) or a fibre core (Natural-Sisal or Synthetic-Polypropylene). For elevator ropes IWRC is almost always preferred as steel core.

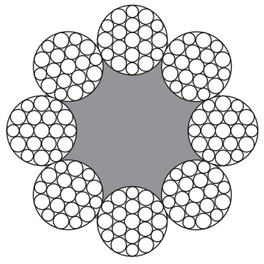
The fibre core provides increased flexibility to the wire rope, and in some cases acts as a reservoir of lubricant. An independent wire rope core is the wire rope in itself, which is used to strengthen the rope and provide resistance to crushing; its flexibility is however less than a wire rope with fibre core.

Wire Rope Construction

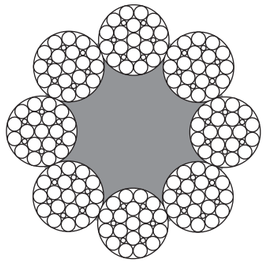
A Wire rope is designated by the number of strands and their construction. For example 8x19S denotes that it is composed of 8 strands and each strand has 19 wires spun together to form a Seale (S) construction. Some other common strand constructions for elevator products are Warrington and Filler and are available in 6, 8 and 9 strand rope construction.



8 x 19S FC



8 x 19W FC



8 x 25F FC

Wire Rope Designation

A wire rope user is expected to specify the correct wire rope for the intended application. It is therefore necessary, besides complete knowledge of the application, to have a clear understanding of the basic symbols and terminology adopted to specify a wire rope.

Wire Rope Diameter

A wire rope is designated first of all by its size, which is called its 'Nominal Diameter'. For example in 1/2" 8x19S and 9.5mm 8x19W, the dimensions 1/2" and 9.5 mm denote the Nominal Diameter of the wire rope.

The nominal diameter of the wire rope is used to identify the product in any given table/chart of any product standard and at the same time it is used to calculate the applicable tolerances of rope diameter.

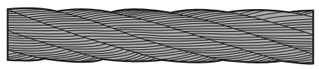
Lay Direction

Lay direction denotes the direction of helical laying of strands around the core.

If the strands appear to move or rotate in clockwise direction, the rope is Right Lay. A Left Lay is opposite to a right lay and the strands appear to move in counter-clockwise direction.

In Ordinary (or Regular) Lay, the wires in the strand are laid in a direction opposite to that of the strand and appear more-or-less parallel to the rope axis; whereas in Lang Lay the wires in the strand are laid in the same direction in which the strands are laid in the wire rope and appear at an angle to the rope axis.

RIGHT
LANG LAY



RIGHT
REGULAR
LAY

When ordering an Elevator rope, provide as many informations as possible.

The following is a general format used to specify a wire rope:

Specifications	Nominal Rope Diameter	Rope Construction	Core	Tensile Grade	Surface Coating of Wire	Lay Type & Direction
Example-1	1/2"	8x19S	IWRC	1370/1770	Bright	RHL
Example-2	9.5mm	8x19W	FC (Sisal)	1570	Galv	RHO

Note: The symbols used by different standards of elevator ropes, for instance EN 12385-5, may also be used to specify a wire rope.

Rope Diameter Tolerance

A wire rope cannot be produced to its absolute size and there is always some applicable tolerance. Brunton Wire Ropes produces its wire ropes to tolerance levels specified in National Standards, International Standards and as specified by the OEMs. Generally applicable rope diameter tolerance is as given below:

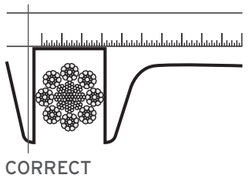
TABLE A

	Rope Designation	Core Type	Nominal Rope Diameter	Tolerance as percentage of nominal diameter		
				Maximum at no load	Minimum at 5% of MBL	Minimum at 10% of MBL
Suspension ropes for traction drive lifts and Governor ropes	6x19 8x19	Fibre	upto 10mm or 3/8"	+6	+1	0
			above 10mm or 7/16"	+5	+1	0
	6x19 8x19 9x19	Steel (IWRC)	upto 10mm or 3/8"	+3	0	-1
			above 10mm or 7/16"	+2	0	-1

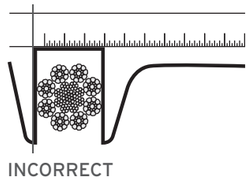
TABLE B

	Nominal Rope Diameter	Tolerance as per nominal diameter	
		Maximum at no load	Minimum at no load
Suspension ropes of roped hydraulic lifts and Compensating ropes	6mm < d < 8mm 1/4" < d < 5/16"	+6	0
	>8mm > 3/8"	+5	0

Note: If not specified, we shall produce wire ropes meeting the diameter tolerance values specified in ISO 4344 and EN 12385-5



Rope Diameter Tolerances
How to measure rope diameter



CORRECT
Measure across the crowns of the strands

INCORRECT
Do not measure across the valleys

Calculating stretch

When a wire rope is subjected to load, its constituent wires and strands try to pull down with accompanied reduction in overall size and an increase in wire rope length. This phenomenon is termed as 'Constructional Stretch' and is very difficult to determine empirically because it depends primarily on the magnitude of applied load, rope construction, and core, besides other factors of smaller influence. These factors vary for each instance and are very difficult to quantify exactly. However, based on years of manufacturing experience and available data, the table (given in the next page) summarises the approximate value of constructional stretch.

A major proportion of constructional stretch occurs immediately after installation of elevator ropes and gradually fades away with cycle of usage, the lighter the load the higher is the time needed for stabilisation.

In addition to constructional stretch, when loaded, the wire rope extends in a manner characterised by proportionality, i.e., stress is proportional to strain. This extension is recoverable, meaning that the rope shrinks back when the applied load is removed, this is termed as 'Elastic Stretch'. A reasonable estimate of elastic stretch may be made by using the values and expression given below:

Elastic Stretch (mm) = [W x L] / [E x A]

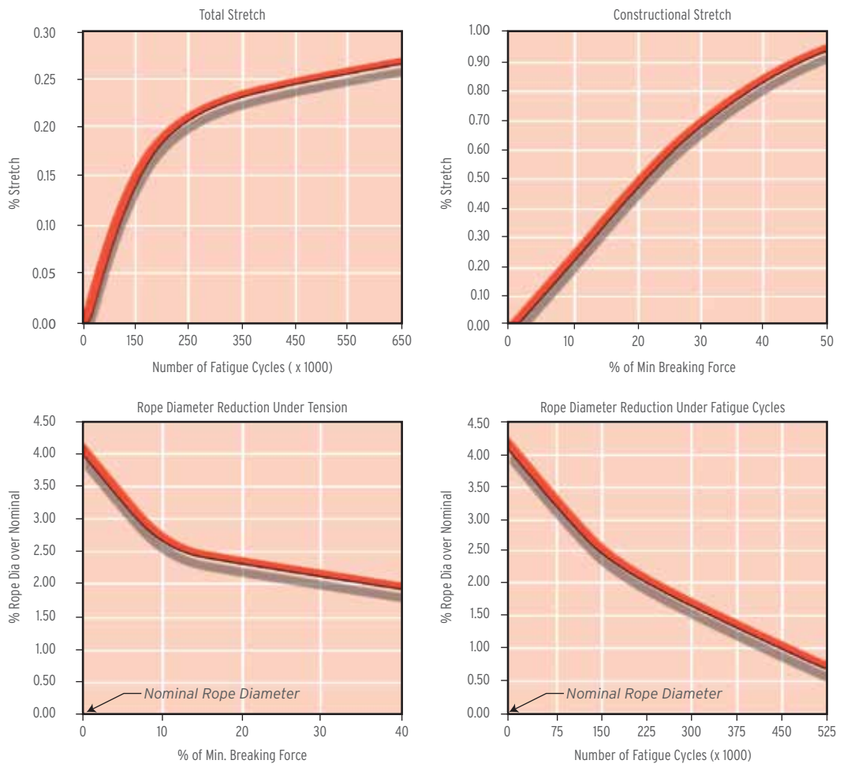
W – Applied Load (N)
L – Rope Length (mm)
E – Modulus of Elasticity (N/mm^2)
A – Metallic Area of Rope (mm^2)

- 'E' value may be taken as 70,000 N/sq mm for 6 stranded fibre core rope; 55,000 N/sq mm for 8 strand fibre core ropes and 65,000 N/sq mm for 8 & 9 strand steel core ropes.
- Metallic Area of Rope is available with rope manufacturer

ROPE BEHAVIOUR

The following tables show the rope behaviour of 1/2" ϕ x19S-NFC when submitted to bending fatigue & tension.

Typical values for Stretch and Diameter reduction



Pre-stretching

Pre-stretching is a technique for removing the constructional stretch, prior to use, by cyclically loading the cable until it shows no constructional stretch. It must however be remembered that repeated handling (particularly coiling / uncoiling) of the wire rope reduces the effect of pre-stretching, although temporarily, which is realised again when the wire rope is loaded after installation.

TABLE A

	Constructional Stretch	Total Stretch
As manufactured wire rope		
6x19 Class with Fibre Core	0.25 - 0.50%	0.40 - 0.75%
8x19 Class with Fibre Core	0.50 - 0.75%	0.70 - 1.05%
8x19 Class with Steel Core 9x19 Class with Steel Core	0.30 - 0.60%	0.45 - 0.85%
Pre–stretched wire rope		
6x19 Class with Fibre Core	0.10 - 0.25%	0.25 - 0.50%
8x19 Class with Fibre Core	0.20 - 0.35%	0.40 - 0.65%
8x19 Class with Steel Core 9x19 Class with Steel Core	0.10 - 0.30%	0.25 - 0.60%

- The values stated above are sensitive to the influence of applied load and other test / site conditions and has been given for general guidance only.
- The stretch of wire rope in an installation is greatly influenced by the efficiency of wire rope tensioning. If the tension is not equal on each rope of the set then each will stretch in proportion to the applied load and is likely to create vibration, which will adversely affect rope performance.

Maintenance

The wires for all elevator ropes produced at Brunton Wire Ropes are lubricated during stranding process with a specialised lubricant with controlled wiping to regulate its quantity on the finished wire rope. The type of lubricant is carefully selected for each category of elevator rope, considering their long service lives, and to ensure that traction is not affected adversely during usage. The natural fibre core is also impregnated with a compatible lubricant to protect the same during its storage and usage.

The lubricant applied during production, however, gradually diminishes during usage and must be replenished periodically with a suitable lubricant. Field lubrication is necessary in order to reduce wear of rope and sheaves, minimise friction between wires, protect the wire rope from corrosion, and increase its service life.

We urge users to follow OEM instructions regarding field lubrication:

- A light viscosity oil with corrosion inhibitors and good penetration is preferred.
- The lubricant may be applied with a spray-can or paint brush or by any other suitable and efficient method.
- The re-lubrication schedule and quantity of lubricant should be decided by maintenance personnel considering atmospheric and technical factors.

Avoid the following

- Excessive lubrication of hoist ropes – check traction, acceleration & deceleration after re-lubrication by running through the complete cycle ample number of times.
- Lubrication of governor ropes – it may interfere with the designed safety function of the device. Check OEM's recommendation.

DRUMS, SHEAVES AND PULLEYS

These should be cast iron or steel and have smoothly finished, machined grooves with rounded edges. Regular inspection of grooves and pulleys, and examination of ropes for correct relative contact and wear is of the utmost importance, especially in the face of ever-increasing shaft speeds.

Minimum Drum/Pulley Diameters

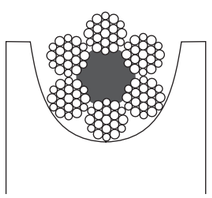
The ratio between the pitch diameter of sheaves, pulleys or drums and the nominal diameter of the rope, irrespective of the number of strands, shall be as shown in Table A:

TABLE A

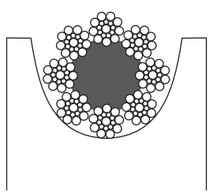
For	Minimum ratio
Suspension ropes	40
Compensation and Governor ropes	30

CONTACT BETWEEN ROPE AND GROOVE

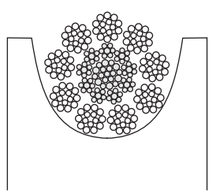
Since ropes have a polygon cross section and are not circular like wire rods, they have a single point contact with the sheaves. Thus, with an 8 strand design & 9 strand design rope, there will be more number of point of contacts with the groove of the drive. This improves the efficiency of the drive & the mechanical power transmission.



6-strands



8-strands

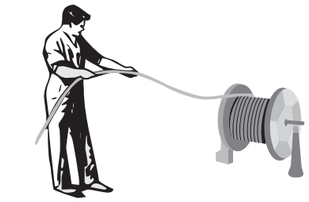


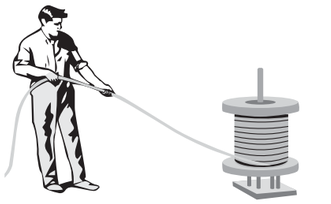
9-strands

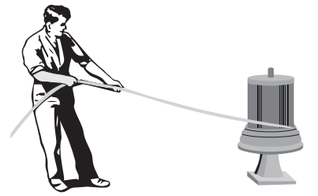
HANDLING & INSTALLATION

Guidelines

- Never pull out rope from stationary coil.
- Place rope coil on ground and roll out straight.
- If heavy, place coil on turntable and pull the end away from coil.
- Prevent contamination with dust, grit, moisture, chemicals and other harmful material.
- Put a shaft (of adequate strength) through reel bore and place the reel in a suitable stand.
- Allow reel to rotate freely and be braked to avoid overrun.
- Provide back-tension for multi-layer spooling and ensure its wind tightly, particularly the bottom layer.
- Maintain constant tension while reeving and avoid layer cross-over.
- Avoid formation of loops and / or kinks.
- Avoid reverse bend during reeving. Wind / unwind ‘top to top’ or ‘bottom to bottom’.
- Take special care while releasing the outboard end of rope from supplied reel or coil.
- Maintain fleet angle at minimum during installation.
- Check that grooves of all sheaves are as recommended and sheaves are free to rotate.
- Check the diameter and pitch of drum grooves and ensure that these are as recommended.
- ‘Run in’ the new rope by running the equipment slowly, with a low load for a number of cycles.
- Inspect that the rope spools correctly on the drum and no slackness or cross-over occurs.







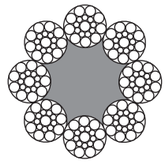
OUR WIDE RANGE OF HIGH PERFORMANCE ROPES FOR ELEVATORS

LIFTFLEX 8F

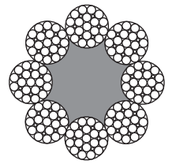
Preferred Rope Construction

8-strand wire rope with

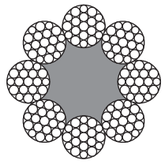
- Seale
- Filler or
- Warrington strand construction and a Fibre core at the centre
  - Most frequently used world-wide
  - Good Bend Fatigue due to smaller wires
  - Good Elongation properties
  - Better Contact on drum sheaves



8 x 19S (9-9-1) + FC



8 x 25F (12-6F-6-1) + FC



8 x 19W (6+6-6-1) + FC

TABLE 1 As per ISO 4344

Nominal Rope Diameter	#Equiv Nominal Rope Diameter	Approx. Mass	Minimum Breaking Force						
			Rope Grade						
			Dual Tensile					Single Tensile	
			*680/1250	**1180/1770	1370/1770	1570/1770	***1670/1960	1570	1770
mm	inch	kg/100m	-	kN	kN	kN	kN	kN	kN
8	5/16	23.1	-	25.7	28.1	30.8	-	29.4	33.2
9		27.7	-	32.5	35.6	38.9	-	37.3	42
9.5	3/8	30.8	26.5	36.2	39.7	43.6	48.8	41.5	46.8
10		33.4	-	40.1	44	48.1	-	46	51.9
11	7/16	41.0	36.5	48.6	53.2	58.1	-	55.7	62.8
12		49.4	-	57.8	63.3	69.2	-	66.2	74.7
12.7	1/2	55.0	47.7	64.7	70.9	77.5	85.4	74.2	83.6
13		57.8	-	67.8	74.3	81.2	-	77.7	87.6
14		66.8	-	78.7	86.1	94.2	-	90.2	102
14.3	9/16	69.5	-	82.1	89.3	98.3	107.8	94	106.2
15		76.6	-	90.3	98.9	108	-	104	117
16	5/8	86.6	74.8	103	113	123	121	118	133
17.5	11/16	104.3	-	123	135	147	160.1	141	159
18		112.8	-	130	142	156	-	149	168
19	3/4	123.4	107.6	145	159	173	174	166	187
20		136.7	-	161	176	192	-	184	207
20.6	13/16	144.0	-	170	-	204	-	-	-
22	7/8	165.4	-	194	213	233	-	223	251

Note : Rope sizes and breaking force not shown in the table, may be available on request and prior confirmation.
Equivalent Nominal Rope Diameter ('inch') is for reference only as the same has been superseded by metric unit (mm)
* 680/1250 rope grade is equivalent to Iron grade
** 1180/1770 rope grade is equivalent to traction steel grade, 1370/1770 may also be used
*** 1670/1960 rope grade is equivalent to EHS steel grade, 1570/1770 may also be used

TABLE 2 As per EN 12385-5

Nominal Rope Diameter	Approx. Mass	Minimum Breaking Force		
		Rope Grade		
		Dual Tensile		Single Tensile
		1180/1770	1370/1770	1570
mm	kg/100m	kN	kN	kN
8	23.1	25.7	28.1	29.4
9	27.7	32.5	35.6	37.3
10	33.4	40.1	44	46
11	41.0	48.6	53.2	55.7
12	49.4	57.8	63.3	66.2
13	57.8	67.8	74.3	77.7
14	66.8	78.7	86.1	90.2
15	76.6	90.3	98.9	104
16	86.6	103	113	118
18	112.8	130	142	149
19	123.4	145	159	166
20	136.7	161	176	184
22	165.4	194	213	223

Note : Rope sizes and breaking force not shown in the table, may be available on request and prior confirmation.

TABLE 3 US Customary Units

Wire rope conforms to the applicable sections of ISO 4344

Nominal Rope Diameter	#Equiv Nominal Rope Diameter	Approx. Mass	Minimum Breaking Force						
			Rope Grade						
			Dual Tensile					Single Tensile	
			*680/1250	**1180/1770	1370/1770	1570/1770	***1670/1960	1570	1770
inch	mm	lb./ft	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1/4	6.3	0.09	-	3580	3920	4290	-	4100	7464
5/16	8	0.15	-	5780	6320	6920	-	6610	9442
3/8	9.5	0.21	5957	8140	8930	9800	10971	9330	10521
7/16	11	0.28	8206	10930	11960	13060	-	12520	14118
1/2	12.7	0.37	10723	14550	15940	17420	19199	16680	18794
9/16	14.3	0.47	-	18460	20210	22100	24235	21150	23875
5/8	16	0.58	16816	23160	25400	27650	27202	26530	29900
11/16	17.5	0.70	-	27650	30260	33050	35992	31670	35745
3/4	19	0.83	24190	32600	35750	38890	39117	37320	42039
13/16	20.6	0.97	-	38220	41930	45860	-	43890	-
7/8	22	1.11	-	43620	47890	52380	-	50140	56427
15/16	23.8	1.30	-	51160	56020	61240	-	58630	-
1	25.4	1.47	-	58220	63750	69700	-	66720	-
1-1/16	27	1.66	-	65740	71980	78700	-	75340	-

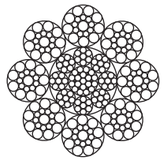
Note : Rope sizes and breaking force not shown in the table, may be available on request and prior confirmation.
Equivalent Nominal Rope Diameter ('mm') is for reference only
* 680/1250 rope grade is equivalent to Iron grade
** 1180/1770 rope grade is equivalent to traction steel grade, 1370/1770 may also be used
*** 1670/1960 rope grade is equivalent to EHS steel grade, 1570/1770 may also be used

LIFTFLEX 8S

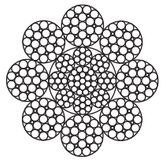
Preferred Rope Construction

8-strand wire rope with

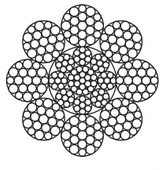
- Seale
- Filler or
- Warrington strand construction and a Steel Core (IWRC) at the centre
  - Very good Bend Fatigue values
  - Very good Elongation properties
  - Better Crushing resistance
  - Better Contact on drum and sheaves



8 x 19S (9-9-1) + IWRC



8 x 25F (12-6F-6-1) + IWRC



8 x 19W (6+6-6-1) + IWRC

TABLE 4 As per ISO 4344

Nominal Rope Diameter	#Equiv Nominal Rope Diameter	Approx. Mass	Minimum Breaking Force				
			Rope Grade				
			Dual Tensile			Single Tensile	
			*1180/1770	1370/1770	**1570/1770	1570	1770
mm	inch	kg/100m	-	kN	kN	kN	kN
8	5/16	26.6	33.6	35.8	38	35.8	40.3
9		32.9	42.5	45.3	48.2	45.3	51
9.5	3/8	37.5	47.4	50.4	53.7	50.4	56.9
10		41.7	52.5	55.9	59.5	55.9	63
11	7/16	50.0	63.5	67.6	71.9	67.6	76.2
12		60.4	75.6	80.5	85.6	80.5	90.7
12.7	1/2	67.9	84.7	90.1	95.9	90.1	102
13		71.6	88.7	94.5	100	94.5	106
14		81.6	102	110	117	110	124
15		92.9	118	126	134	126	142
16	5/8	105.6	134	143	152	143	161
18		133.7	170	181	193	181	204
19	3/4	149.0	190	202	215	202	227
20		165.0	210	224	238	224	252
22	7/8	199.7	254	271	288	271	305

Note: Rope sizes and breaking force not shown in the table, may be available on request and prior confirmation.
#Equivalent Nominal Rope Diameter ('inch') is for reference only as the same has been superseded by metric units (mm)
* 1180/1770 rope grade is equivalent to Traction steel grade, 1370/1770 may also be used
** 1570/1770 rope grade is equivalent to EHS steel grade

TABLE 5 As per EN 12385-5

Nominal Rope Diameter	Approx. Mass	Minimum Breaking Force			
		Rope Grade			
		Dual Tensile		Single Tensile	
		1370/1770	1570/1770	1570	1770
mm	kg/100m	kN	kN	kN	kN
8	26.6	35.8	38	35.8	40.3
9	32.9	45.3	48.2	45.3	51
10	41.7	55.9	59.5	55.9	63
11	50.0	67.6	71.9	67.6	76.2
12	60.4	80.5	85.6	80.5	90.7
13	71.6	94.5	100	94.5	106
14	81.6	110	117	110	124
15	92.9	126	134	126	142
16	105.6	143	152	143	161
18	133.7	181	193	181	204
19	149.0	202	215	202	227
20	165.0	224	238	224	252
22	199.7	271	288	271	305

Note: Rope sizes and breaking force not shown in the table, may be available on request and prior confirmation.

TABLE 6 US Customary Units

Wire rope conforms to the applicable section of ISO 4344

Nominal Rope Diameter	#Equiv Nominal Rope Diameter	Approx. Mass	Minimum Breaking Force				
			Rope Grade				
			Dual Tensile			Single Tensile	
			*1180/1770	1370/1770	**1570/1770	1570	1770
inch	mm	lb./fl.	lbs.	lbs.	lbs.	lbs.	lbs.
5/16	8	0.18	7550	8050	8540	8050	9060
3/8	9.5	0.25	10660	11330	12070	11330	12790
7/16	11	0.34	14280	15200	16160	15200	17130
1/2	12.7	0.46	19040	20260	21560	20260	22930
9/16	14.3	0.57	24140	25700	27330	25700	28970
5/8	16	0.71	30130	32150	34170	32150	36200
11/16	17.5	0.85	36150	38480	40930	38480	43380
3/4	19	1.00	42720	45410	48340	45410	51030
13/16	20.6	1.18	50100	53320	56720	53320	60120
7/8	22	1.34	57100	60930	64750	60930	68570

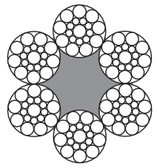
Note: Rope sizes and breaking force not shown in the table, may be available on request and prior confirmation.
#Equivalent Nominal Rope Diameter ('mm') is for reference only
* 1180/1770 rope grade is equivalent to Traction steel grade, 1370/1770 may also be used
** 1570/1770 rope grade is equivalent to EHS steel grade

LIFTFLEX 6F

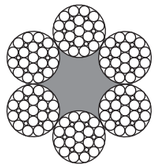
Preferred Rope Construction

6-strand wire rope with

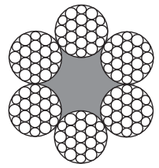
- Seale
- Filler or
- Warrington strand construction and a Fibre Core at the centre
  - 6x19 is mostly used as Governor Rope
  - Good Bend Fatigue values
  - Good Elongation properties



6 x 19S (9-9-1) + FC



6 x 25F (12-6F-6-1) + FC



6 x19W (6+6-6-1) + FC

TABLE 7 As per ISO 4344

Nominal Rope Diameter	#Equiv Nominal Rope Diameter	Approx. Mass	Minimum Breaking Force			
			Rope Grade			
			Dual Tensile		Single Tensile	
			*1180/1770	1370/1770	1570	**1770
mm	inch	kg/100m	kN	kN	kN	kN
6		13.0	16.3	17.8	18.7	21
6.3	1/4	14.4	17.9	-	-	23.2
6.5		15.4	19.1	20.9	21.9	24.7
8	5/16	23.5	28.9	31.7	33.2	37.4
9		28.9	36.6	40.1	42	47.3
9.5	3/8	32.2	40.8	44.7	46.8	52.7
10		35.9	45.2	49.5	51.8	58.4
11	7/16	43.7	54.7	59.9	62.7	70.7
12		51.3	65.1	71.3	74.6	84.1
12.7	1/2	58.1	72.9	79.8	83.6	94.2
13		61.0	76.4	83.7	87.6	98.7
14		70.4	88.6	97	102	114
14.3	9/16	73.4	92.4	-	-	119
15		81.1	102	111	117	131
16	5/8	91.9	116	127	133	150
17.5	11/16	110.0	138	-	-	179
18		116.4	146	160	168	189
19	3/4	130.0	163	179	187	211
20		144.1	181	198	207	234
20.6	13/16	152.0	192	-	-	248
22	7/8	174.0	219	240	251	283

Note: Rope sizes and breaking force not shown in the table, may be available on request and prior confirmation.
#Equivalent Nominal Rope Diameter ('inch') is for reference only as the same has been superseded by metric units (mm)
* 1180/1770 rope grade is equivalent to Traction steel grade, 1370/1770 may also be used
** 1770 rope grade is equivalent to EHS steel grade

TABLE 8 As per ISO EN 12385-5

Nominal Rope Diameter	Approx. Mass	Minimum Breaking Force			
		Rope Grade			
		Dual Tensile		Single Tensile	
		1180/1770	1370/1770	1570	1770
mm	kg/100m	kN	kN	kN	kN
6	13.0	16.3	17.8	18.7	21
6.5	15.4	19.1	20.9	21.9	24.7
8	23.5	28.9	31.7	33.2	37.4
9	28.9	36.6	40.1	42	47.3
10	35.9	45.2	49.5	51.8	58.4
11	43.7	54.7	59.9	62.7	70.7
12	51.3	65.1	71.3	74.6	84.1
13	61.0	76.4	83.7	87.6	98.7
14	70.4	88.6	97	102	114
15	81.1	102	111	117	131
16	91.9	116	127	133	150
18	116.4	146	160	168	189
19	130.0	163	179	187	211
20	144.1	181	198	207	234
22	174.0	219	240	251	283

Note: Rope sizes and breaking force not shown in the table, may be available on request and prior confirmation.

TABLE 9 US Customary Units

Wire Rope conforms to the applicable sections of ISO 4344

Nominal Rope Diameter	#Equiv Nominal Rope Diameter	Approx. Mass	Minimum Breaking Force			
			Rope Grade			
			Dual Tensile		Single Tensile	
			*1180/1770	1370/1770	1570	**1770
inch	mm	lb./ft.	lbs.	lbs.	lbs.	lbs.
1/4	6.3	0.10	4020	4420	4620	5220
5/16	8	0.16	6500	7130	7460	8410
3/8	9.5	0.22	9170	10050	10520	11850
7/16	11	0.29	12300	13470	14100	15890
1/2	12.7	0.39	16390	17940	18800	21180
9/16	14.3	0.49	20770	22760	23820	26750
5/8	16	0.62	26080	28550	29900	33720
11/16	17.5	0.74	31030	34080	35670	40240
3/4	19	0.87	36650	40240	42040	47440
13/16	20.6	1.02	43170	47230	49430	55760
7/8	22	1.17	49240	53960	56430	63620
15/16	23.8	1.37	57620	63090	66030	74450
1	25.4	1.56	65580	71800	75150	84720
1-1/16	27	1.76	74040	81070	84850	95660

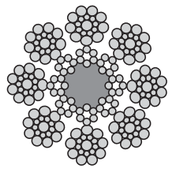
Note: Rope sizes and breaking force not shown in the table, may be available on request and prior confirmation.
#Equivalent Nominal Rope Diameter ('mm') is for reference only
* 1180/1770 rope grade is equivalent to Traction steel grade, 1370/1770 may also be used
** 1770 rope grade is equivalent to EHS steel grade

LIFTFLEX 8C

Preferred Rope Construction

8-strand wire rope with Seale construction and steel-reinforced fibre core

- Highly suitable for low & mid rise
- Excellent wear resistant
- Low elongation
- Extended service life
- Very good crushing resistance
- Normal to heavy use levels



8x19S (9-9-1) + IWRC (8x7+FC)

TABLE 10

Wire Rope conforms to the applicable section of ISO 4344 & EN12385

Nominal Rope Diameter	#Equiv Nominal Rope Diameter	Approx. Mass	Minimum Breaking Force
			Rope Grade
			Single Tensile
			1570
mm	inch	kg/100m	kN
8		24.9	38
9		31.5	48.3
9.5	3/8	35.3	54.4
10		37.8	60.5
11		46.5	73.4
12		56.0	86.8
12.7	1/2	62.7	98.3
13		65.6	103.1
14		74.9	119.3
15		87.4	137.6
16	5/8	97.2	154.8
17.5	11/16	119.4	187
18		125.9	193.6
19	3/4	137.9	217.6
20		152.8	241.5

Note: Rope sizes and breaking force not shown in the table, may be available on request and prior confirmation.

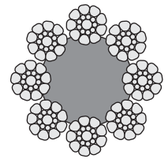
#Equivalent Nominal Rope Diameter ('inch') is for reference only as the same has been superseded by metric unit (mm)

#Combination core rope generally available in rope grade 1570, may be available with other grade on request

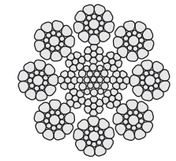
LIFTFORM 8S

Brunton Wire Ropes has developed new generation compacted elevator ropes considering the demand of hoist ropes for faster installations in conjunction with smaller shaves.

- Extended service life
- Greater bending resistance
- Very high wear resistant
- Less elongation
- High breaking load



8x19S + Fibre Core



8x19S + Metal Core

TABLE 11

Nominal Rope Diameter	#Equiv Nominal Rope Diameter	Approx. Mass		Minimum Breaking Force	
		Fibre Core	Steel Core	*Fibre Core	**Steel Core
mm	inch	kg/100m		kN	kN
8	5/16	0.20	0.28	29.4	46.6
9.5	3/8	0.32	0.39	41.8	64.9
10		0.36	0.42	46.0	71.9
12.7	1/2	0.58	0.68	75.8	117.8
13		0.63	0.73	79.4	123.4
16	5/8	0.92	1.11	119.8	186.2

Note: Rope sizes and breaking force not shown in the table, may be available on request and prior confirmation.

*Fibre core generally available in rope grade 1180, may be available with other grade on request

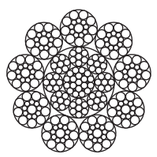
** Steel core rope generally available in rope grade 1570, may be available with other grade on request

LIFTFLEX 9S

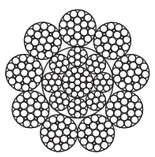
Preferred Rope Construction

9-strand rope with

- Seale
- Filler or
- Warrington strand construction and a Steel core (IWRC) at the centre
  - Excellent Bend Fatigue values
  - Very Good Elongation properties
  - Very Good Crushing resistance
  - Enhanced Contact on drum and sheaves



9 x 19S (9-9-1) + IWRC



9 x 25F (12-6F-6-1) + IWRC

TABLE 12 SI Units

Wire Rope conforms to the applicable sections of ISO 4344 & EN 12385

Nominal Rope Diameter	#Equiv Nominal Rope Diameter	Approx. Mass	Minimum Breaking Force			
			Rope Grade			
			Dual Tensile		Single Tensile	
			1370/1770	*1570/1770	1570	1770
mm	inch	kg/100m	kN	kN	kN	kN
8	5/16	28.1	39.6	42.1	39.6	44.6
9		35.6	50.1	53.3	50.1	56.5
9.5	3/8	39.6	55.8	59.4	55.8	62.9
10		43.9	61.8	65.8	61.8	69.7
11	7/16	53.1	74.8	79.6	74.8	84.4
12		63.2	89	94.7	89	100
12.7	1/2	70.8	99.7	106	99.7	112
13		74.2	105	112	105	118
14		86.1	121	129	121	137
15		98.8	139	148	139	157
16	5/8	112.4	158	168	158	179
17.5		134.5	189	202	189	214
18		142.3	200	213	200	226
19	3/4	158.5	223	238	223	252
20		175.7	247	263	247	279
22	7/8	212.5	299	318	299	338

Note: Rope sizes and breaking force not shown in the table, may be available on request and prior confirmation.

#Equivalent Nominal Rope Diameter (‘inch’) is for reference only
*1570 / 1770 rope grade is equivalent to EHS steel grade

TABLE 13 US Customary Units

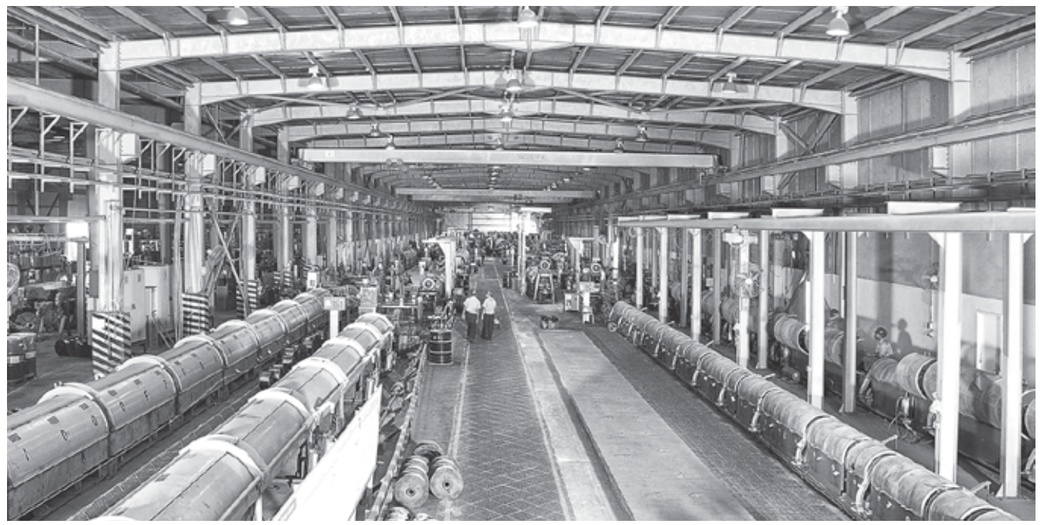
Wire Rope conforms to the applicable sections of ISO 4344

Nominal Rope Diameter	#Equiv Nominal Rope Diameter	Approx. Mass	Minimum Breaking Force			
			Rope Grade			
			Dual Tensile		Single Tensile	
			1370/1770	*1570/1770	1570	1770
inch	mm	lb./ft	lbs.	lbs.	lbs.	lbs.
5/16	8	0.19	8900	9470	8900	10030
3/8	9.5	0.27	12550	13350	12550	14150
7/16	11	0.36	16830	17900	16830	18970
1/2	12.7	0.48	22430	23860	22430	25290
9/16	14.3	0.60	28440	30250	28440	32060
5/8	16	0.76	35600	37870	35600	40140
11/16	17.5	0.90	42590	45300	42590	48020
3/4	19	1.06	50200	53400	50200	56600
13/16	20.6	1.25	59020	62770	59020	66530
7/8	22	1.43	67310	71600	67310	75880

Note: Rope sizes and breaking force not shown in the table, may be available on request and prior confirmation.

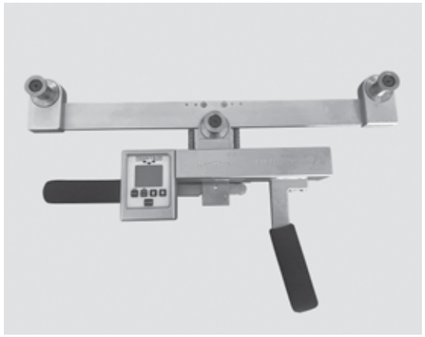
#Equivalent Nominal Rope Diameter in metric units (‘mm’) is for reference only

*1570 / 1770 rope grade is equivalent to EHS steel grade



ACCESSORIES

Digital Tension Meter



- Cable, wire rope, and more
- Flexible materials
- 1/16" to 3/4" diameter (1.6 - 19 mm)
- Tension 10 - 2,000 lb. (5 - 907 kg)
- Static or slowly moving applications

Using a Digital Tension Meter:

- Turn unit on and select material.
- Place material on rollers, then tighten lever to engage.
- Tension will be displayed.

Features and Specifications:

- Calibrated for up to ten materials
- Accurate +/- 2% full-scale
- Large, clear, color display
- Shows tension in lb, kg, or daN
- Dynamic bar graph provides quick, color visual of tension levels
- Stores tension values with one touch
- Calculates data statistics (count, max, min, average, standard deviation)
- Stabilises readings on moving material with adjustable LCD refresh rates and data averaging feature
- One-year warranty against factory defects
- Data can be output to an electronic device with RS-232 or analog output options
- Calibration certificate included with values traceable to NIST standards
- Includes power supply: Input: 100-240VAC, 50-60Hz, 0.48A, Output: 9 VDC, 2.2A
- Rechargeable NiMH battery is safe for air transport and provides up to 12 hours continuous use per charge.

Sheave Gauge

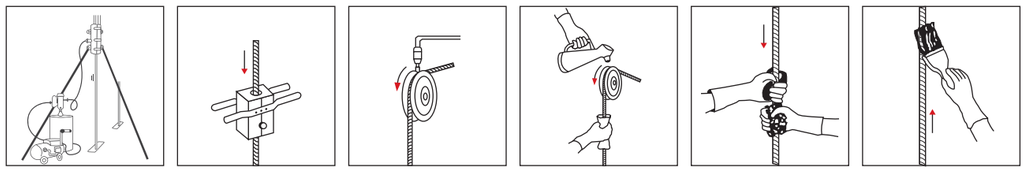
The sheave gauge allows technicians to quickly determine worn-out sheave grooves. If light can be seen under the sheave gauge, then the sheave groove is worn-out.

Secondary Lubricant

During production, wire ropes are laced with adequate lubrication. The main purpose of in-process lubrication is to maintain rope performance during operation and provide ample protection against corrosion. The protection provided by the original manufacturing lubricant is enough to prevent rope corrosion during the first period of use. Steel wire ropes must be periodically checked, depending on rope working type and environmental conditions; they must also be re-lubricated at regular intervals, depending on their use, particularly along the working zone which is subjected to bending. We recommend the use of NYROSTOL 65 as a secondary lubricant, or Elaskon NK-BB & Elaskon Oil #60, since these lubricants are compatible to our manufacturing lubricant.

NYROSTEN WIRE PROTECTION ELASKON

Some typical lubrication modes are shown in the following figure:



PRESSURE LUBRICATOR | CONTINUOUS BATH | SPRAY NOZZLE | POURING | SWABBING | PRINTING

INSPECTION AND DISCARD CRITERIA

Excerpts from ISO 4344, Annex E

Rope conditions must be periodically checked by a competent person capable to assess where the rope is still fit and safe for use or if specific actions, like discard, are required.

The most common causes for discard are broken wires, wear, corrosion, excessive stretch or localized damages such as local diameter reduction or waviness.

In case a single rope reaches discard criteria, the whole set shall be replaced, unless this has occurred during installation or before being put in service.

In these cases it is possible to replace the single rope only, provided that the wire rope data of the replacement one correspond to the certificate data of the original set, the rope termination is the same and the diameter of the new rope does not vary from the other ropes of the set by more than 0.5% of the nominal diameter.

Possible variations in the rope diameter shall be taken under control: replacement should be considered if its value reduces over 6% the nominal diameter.

Other local variations in the rope structure or surface shall be promptly detected: for example, red dust protruding from the strands or wires indicating fretting corrosion shall be carefully checked.

A distributed presence of broken wires could be due to rope fatigue, which typically shows a fast deterioration rate as soon as the ropes reaches the end of its service life. The presence of broken wires should be periodically monitored, in case the number exceeds the prescribed values the rope should be replaced or be subjected to further examinations at periodical intervals as stated by the competent person.

Some guidelines for discard criteria for the maximum allowed number of visible broken wires are shown in the following table.

	6x19 Fiber core		8x19 and 8x25 Fiber, mixed and Steel core		9x19 and 9x25 Steel core	
Type of broken wires	Follow expert's indications	Discard immediately	Follow expert's indications	Discard immediately	Follow expert's indications	Discard immediately
Randomly distributed in outer strands	12/lay	24/lay	15/lay	30/lay	17/lay	34/lay
Predominantly in one or two strands	6/lay	8/lay	8/lay	10/lay	9/lay	11/lay
Adjacent in two strands	4	Over 4	4	Over 4	6	Over 6
In the valleys between the strands	1/lay	1/lay	1/lay	1/lay	1/lay	1/lay

Definitions

Competent person: designated person, suitably trained, qualified by knowledge and experience and with the necessary instruction to ensure that the required operations are correctly carried out.

Excerpts from ASME A17.6-2010, Section 1.10

For more details, see ASME code/standard excerpts below (the applicable code/standard differs by jurisdiction and therefore we have listed both ASME A17.1b-2009/CSA B44b-09 and ASME A17.6-2010 information in this catalog - local code always takes precedence).

Crown breaks:

The crown wires are those that make contact with the sheave and they will show signs of abrasion. If enough abrasion and/or rope fatigue due to bending takes place, the crown wires will break. When using this criterion, an inspector is looking for the number of total crown wire breaks within a rope lay. A rope lay is approximately 6.5 times the diameter of the rope.

Valley breaks:

The valley wires are located in the valleys of two adjacent strands. They do not make contact with the sheave and therefore should not experience abrasion. Valley breaks are attributed to rope fatigue due to bending.

Diameter reduction:

If the ropes reach a specified diameter reduction, they should be replaced even if no crown or valley breaks are present.

Red dust or rouge:

The existence of red dust, or rouge, is also a factor in determining rope replacement.

Excerpts from ASME A17.6-2010, Section 1.10

Notes:

(1) Replacement criteria for steel wire rope are based on the worst conditions of diameter and wire breaks. Crown wires are subject to both wear that reduces the diameter of the rope and the breaks that occur in the wear area. Breaks that are visible and occur outside of the crown wear area with the crown wire intact are called valley breaks.

(2) Where ropes are subjected to reverse bends or where ropes are installed on nonmetallic sheaves or sheaves with nonmetallic liners or inserts, extra attention must be given to the rope due to possible acceleration of valley breaks.

1.10.1 Traction Drive Machines

1.10.1.1

Replacement requirements for steel wire suspension ropes for traction elevators shall be as follows (see Non-Mandatory Appendix A):

(a) The steel wire rope(s) shall be replaced if the rope is permanently kinked, bent, or deformed in any way (see 1.10.5).

(b) For rope diameters equal to or greater than 8 mm (0.315 in.), the ropes shall be replaced in accordance with 1.10.1.2(a) through 1.10.1.2(g) and 1.10.3.

(c) For rope diameters less than 8 mm (0.315 in.), the ropes shall be replaced in accordance with 1.10.1.2(a) through (g), 1.10.1.2.1 and 1.10.1.2.2, and 1.10.3. In addition, other replacement criteria based on the application shall be permitted to be applied. The replacement criteria shall be documented in the Maintenance Control Program (see ASME A17.1/CSA B44, requirement 8.6.1.4.1).

1.10.1.2

Criteria for replacement include at least one of the following:

(a) if the broken crown wires are equally distributed among the strands, when the number of broken wires per rope lay in the worst section of rope exceeds the values shown in the "Normal Wear Conditions," first column of Table 1.10.1.2-1

(b) if the distribution of breaks is unequal and broken crown wires predominate in one or two strands, when the number of broken wires per rope lay in the worst section of rope or the minimum diameter exceeds the values shown in the "Normal Wear Conditions," first column of Table 1.10.1.2-1

(c) if four wires, side by side, are broken across the crown of any strand, when the number of broken wires per rope lay in the worst section of rope exceeds the values shown in the "Normal Wear Conditions," first column of Table 1.10.1.2-1

(d) if an unfavorable condition exists, such as but not limited to corrosion due to external conditions, excessive wear of individual wires in the strands, unequal tension, poor sheave grooves; the criteria for broken crown wires shall be the values indicated in the "Unfavorable Wear Conditions," second column of Table 1.10.1.2-1 for any of the conditions described above

(e) if red dust or rouge exists, the criteria for broken wires shall be the values indicated in the "Rope Showing Rouge," third column of Table 1.10.1.2-1 for any of the conditions described above

(f) if there is more than one valley break per rope lay

(g) if there are any valley breaks at any location where rouge exists.

1.10.1.2.1

The elevator manufacturer using information from the rope manufacturer and considering the application, shall establish the design life limit to ensure that the residual strength of wire ropes less than 8 mm (0.315 in.) diameter is not less than 60% of the minimum breaking force at the time of replacement.

1.10.1.2.2

Steel wire ropes of less than 8 mm (0.315 in.) in diameter shall be replaced when there is evidence of rouge.

TABLE 1.10.1.2-1 Wire Breaks:

Crown Wire Breaks Per Lay Length

6-Strand Rope Applications			
	Normal Wear Conditions	Unfavorable Wear Conditions	Ropes Showing Rouge
Distributed breaks (max.)	24	12	12
Unequal breaks (max.)	8	4	4
4 Side-by-Side Breaks	12	6	6

8- and 9-Strand Rope Applications			
	Normal Wear Conditions	Unfavorable Wear Conditions	Ropes Showing Rouge
Distributed breaks (max.)	32	16	16
Unequal breaks (max.)	10	5	5
4 Side-by-Side Breaks	16	8	8

GENERAL NOTES:

(a) Where ropes are subjected to reverse bends or where ropes are installed on nonmetallic coated, plastic, fiber-reinforced plastic sheaves or sheaves with nonmetallic liners or inserts, extra attention must be given to any steel wire rope (6, 8, or 9 strand) due to possible acceleration of valley breaks.

(b) This table does not apply to Winding Drum Machines. See 1.10.2 for replacement criteria.

(c) No more than one valley break per lay length and no valley breaks allowed if visible rouge.

(d) For ropes less than 8 mm, also see 1.10.1.2.2 for additional replacement requirements.

1.10.2 Winding Drum Machines

Suspension ropes shall be replaced on winding drum machines if:

(a) the broken crown wires are equally distributed among the strands, when the number of broken wires per rope lay in the worst section of rope exceeds 12;

(b) the broken crown wires predominate in one or two strands, when the number of broken wires per rope lay in the worst section of rope exceeds 6;

(c) there is more than one valley break per rope lay; or

(d) there are any valley breaks at any location where rouge exists

1.10.3 All Elevator Types

The suspension, compensation, and governor ropes shall be replaced when their actual diameter is reduced below the value shown in Table 1.10.3-1 (see next page). For nominal diameters not listed in Table 1.10.3-1, the minimum diameter reduction shall be calculated using the criteria outlined in General Notes (a) and (b) of Table 1.10.3-1. Normal wear diameters, unfavorable wear, and rouge conditions as listed in the table shall apply. Compensation and governor ropes shall also conform to 1.10.1.1(a) and 1.10.1.2(a) through 1.10.1.2(g).

Measurement for diameter shall be taken on a straight portion of rope at the worst location. Two measurements at the same position at right angles shall be taken. The ropes shall be replaced if both of these measurements are below the replacement value. However, if only one of the measurements is below the replacement value, then the criteria for wire breaks under "Unfavorable Wear Conditions" shall apply. See Table 1.10.1.2-1.

1.10.4 Replacement of Ropes

Replacement of all ropes, except governor ropes (see ASME A17.1/CSA B44, requirement 8.6.3.4), shall conform to the requirements of 1.10.4.1 through 1.10.4.6.

1.10.4.1

Replacement ropes shall be as specified by the original elevator manufacturer or be at least equivalent in strength, weight, and design.

1.10.4.2

Ropes that have previously been installed and used on another installation shall not be reused.

1.10.4.3

When replacing suspension, compensating, and car or drum counterweight ropes, all ropes in a set shall be replaced, except as permitted by 1.10.5.

1.10.4.4

The ropes in the set shall be new, all from the same manufacturer and of the same material, grade, construction, and diameter.

1.10.4.5

Data tags conforming to ASME A17.1/CSA B44, requirement 2.20.2.2 shall be applied.

1.10.4.6

Suspension, car, and drum counterweight rope fastenings shall conform to ASME A17.1/CSA B44, requirement 2.20.9.

1.10.5 Replacement of a Single Suspension Rope

If one rope of a set is worn or damaged and requires replacement, the entire set of ropes shall be replaced; except, where one rope has been damaged during installation or acceptance testing prior to being subjected to elevator service, it shall be permissible to replace a single damaged rope with a new rope provided that the requirements of 1.10.4.4 and 1.10.5.1 through 1.10.5.1.6 are met. NOTE: Damage includes but is not limited to kinked ropes.

1.10.5.1

The steel wire rope data for the replacement rope must correspond to the steel wire rope data specified in ASMEA17.1/CSA B44, requirement 2.20.2.2.

1.10.5.2

The replacement rope shall be provided with a data tag conforming to ASME A17.1/CSA B44, requirement 2.20.2.2.

1.10.5.3

The suspension ropes, including the damaged rope, shall not have been shortened since their original installation.

1.10.5.4

The diameter of any of the remaining ropes shall not be less than the nominal diameter minus 0.4 mm (0.015 in.).

1.10.5.5

The tension of the new replacement rope shall be checked and adjusted as necessary at semi-monthly intervals over a period of not less than 2 months after installation. If proper equalization of the rope tension cannot be maintained after 6 months, the entire set of suspension ropes shall be replaced.

1.10.5.6

The replacement rope shall be provided with the same type of suspension rope fastening used with the other ropes.

TABLE 1.10.3-1 Minimum Diameter

6-, 8-, and 9-Strand Rope Applications						
	Normal Wear Conditions		Unfavorable Wear Conditions		Ropes Showing Rouge	
Normal Rope Size	in.	mm	in.	mm	in.	mm
4mm	0.153	3.875	0.153	3.875	Note (1)	Note (1)
5 mm	0.191	4.844	0.191	4.844	Note (1)	Note (1)
6 mm	0.229	5.831	0.229	5.813	Note (1)	Note (1)
1/4 in.	0.242	6.152	0.242	6.152	Note (1)	Note (1)
6.5 mm	0.248	6.297	0.248	6.297	Note (1)	Note (1)
6.7 mm	0.256	6.491	0.256	6.491	Note (1)	Note (1)
5/16 in.	0.303	7.689	0.303	7.689	Note (1)	Note (1)
8 mm	0.295	7.500	0.259	7.500	0.305	7.750
9 mm	0.332	8.438	0.332	8.438	0.343	8.719
3/8 in.	0.352	8.930	0.352	8.930	0.363	9.227
10 mm	0.369	9.375	0.369	9.375	0.381	9.668
11 mm	0.406	10.31	0.406	10.31	0.420	10.66
5/16 in.	0.410	10.42	0.410	10.42	0.424	10.77
12 mm	0.443	11.25	0.443	11.25	0.458	11.63
1/2 in.	0.469	11.91	0.469	11.91	0.484	12.30
13 mm	0.480	12.19	0.480	12.19	0.469	1259
14 mm	0.517	13.13	0.517	13.13	0.534	13.56
9/16 in.	0.527	13.39	0.527	13.39	0.545	13.84
15 mm	0.554	14.06	0.554	14.06	0.572	14.53
5/8 in.	0.586	14.88	0.586	14.88	0.605	15.38
16 mm	0.591	15.00	0.591	15.00	0.610	15.50
11/16 in.	0.645	16.37	0.645	16.37	0.666	16.92
18 mm	0.664	16.88	0.664	16.88	0.687	17.44
19 mm	0.701	17.81	0.701	17.81	0.725	18.41
3/4 in.	0.703	17.86	0.703	17.86	0.727	18.45
20 mm	0.738	18.75	0.738	18.75	0.763	19.38
13/16 in.	0.762	19.35	0.762	19.35	0.787	19.99
22 mm	0.812	20.63	0.812	20.63	0.839	21.31
7/8 in.	0.820	20.84	0.820	20.84	0.848	21.53
15/16 in.	0.879	22.32	0.879	22.32	0.908	23.07
1 in.	0.938	23.81	0.938	23.81	0.969	24.61
1 1/8 in.	1.055	26.79	1.055	26.79	1.090	27.68
1 1/4 in.	1.172	29.77	1.172	29.77	1.211	30.76
1 3/8 in.	1.289	32.74	1.289	32.74	1.332	33.83
1 1/2 in.	1.406	35.72	1.406	35.72	1.453	36.91

NOTES:

a) Maximum allowable diameter reduction below nominal for rope diameters less than 8 mm is 3.125%.

b) Maximum allowable diameter reduction below nominal for rope diameters equal to or greater than 8 mm are as follows: (1) Normal wear or unfavorable wear conditions is 6.25%. (2) Ropes showing rouge is 3.125%.

NOTE:

1) For ropes less than 8 mm, the rope must be replaced if rouge is evident. See 1.10.1.2.2.

SAFETY INFORMATION

- Wire rope will fail if worn out, shock loaded, overloaded, misused, damaged, improperly maintained or abused.
- Always inspect wire rope for wear, damage or abuse before use.
- Never use a wire rope which is worn out, damaged, corroded or abused.
- Never overload or shock load a wire rope.
- Use the correct design factor for the application.
- Inform yourself : Read and understand the machinery manufacturers handbook and guidance from the wire rope manufacturer.
- Refer to applicable directives, regulations, standards and codes concerning inspection, examination and rope removal criteria.

METRIC - IMPERIAL DIAMETER CONVERSION											
in.	mm.	in.	mm.	in.	mm.	in.	mm.	in.	mm.	in.	mm.
5/32	3.97	1/2	12.7	15/16	23.8	1 1/2	38.1	2 1/2	63.5	4 1/4	108.0
3/16	4.76	9/16	14.3	1	25.4	1 5/16	41.3	2 3/4	69.9	4 1/2	114.3
7/32	5.56	5/8	15.9	1 1/16	27.0	1 3/4	44.5	3	76.2	4 3/4	120.7
1/4	6.35	11/16	17.5	1 1/8	28.6	1 7/8	47.6	3 1/4	82.6	5	127.0
5/16	7.94	3/4	19.0	1 3/16	30.2	2	50.8	3 1/2	88.9		
3/8	9.53	13/16	20.6	1 1/4	31.8	2 1/8	54.0	3 3/4	95.3		
7/16	11.1	7/8	22.2	1 3/8	34.9	2 1/4	57.2	4	101.6		

CONVERSION TABLE				
Length	1m	= 1000 mm	= 3,281ft	= 39,37 inch
Force	1kN	= 101,97kp	= 0,10197 t metric-f	= 224lbs-f
Tensile Strength	1N/mm2	= 0,10197 kp/mm2	= 145,04 p.s.i.	= 10 bar
Cross Section	1 mm2	= 0,00155 sq.inch		
Weight	1 metric t	= 1000 kg = 1,102 short t	= 0,9842 long t	= 2204,6 lbs
Weight per Length Unit	1 kg/m	= 0,672 lbs/ft		