ELEVATOR PRODUCTS

PFEIFER
DRAKO

11/2007

Elevator Ropes

PFEIFER DRAKO
DRAHTSEILWERK GMBH & CO. KG

RHEINSTRASSE 19-23
D-45478 MUELHEIM AN DER RUHR
PHONE +49 (0)208-4 29 01-0
FAX +49 (0)208-4 29 01-21
E-MAIL elevator_products@drako.de
INTERNET www.drako.de

Elevator Ropes

PFEIFER DRAKO, a German company belonging to PFEIFER GROUP, is a reliable partner worldwide where people need to travel vertically. With its long history of almost 200 years PFEIFER DRAKO is famous for elevator steel wire rope – and of course the comprehensive service by the brand name of DRAKO. Jointly with leading manufacturers and operators of elevators we look for and provide the best solutions to the benefit of our customers. The world-renowned expertise and legendary quality we offer are found in major projects of elevator industry all around the globe.

We have a sales network and numerous subsidiaries across various continents consisting of qualified and competent personnel, which supports us to build long-term and close relationships with the most demanding rope customers. We continuously deepen our specialist knowledge in cooperation with universities and institutes to use efficient regulation and control systems; the rational and precise serial production and individual project manufacturing for each specific customer are in accordance with our quality management system (QMS) governed by DIN EN ISO 9001:2000.

Our mission statement is defined as our adherence to the most up-to-date technical know-how, high-quality materials, safety, user-comfort and economic efficiency which are turned into a set of values transferred to our customers and enable us to embrace every challenge in a multi-cultural world.

Our new location of production and logistics – Rheinstraße, Muelheim an der Ruhr

Cover page:

Federation Tower Moscow, ThyssenKrupp Elevator AG

Torre Espacio Madrid, Schindler Management AG

PFEIFER DRAKO

Advantages of DRAKO steel wire rope

- special wire ropes for your application
- tested and reliable strand constructions, high adaptation possibilities
- long service life
- DRAKO-made fibre core, constant quality
- low elastic and permanent elongation
- low maintenance costs
- 100% rope quality control, high quality assurance
- fair price performance ratio
- high qualified and experienced personnel
- competent consultation
- reliable service
- worldwide sales network

Machines with the latest technology in the production process

Contents

About Wire Ropes

Definitions, Designation and Classification 4
Elevator Rope Construction 5
Quality, Testing, Tolerances of Rope Diameter 6
Contact between Rope and Groove, Stand Constructions 7

Rope Selection

Ropes for Traction Drive Elevators 8-13
- Special Traction Ropes for Smaller Diameters 8
- Ropes with Fibre Core (FC) 9
- Ropes with Steel and Fibre Core 10
- Ropes with Steel Core (IWRC) 11-12
- Compensating Ropes 13

Governor Ropes 13
Ropes for Roped Hydraulic Elevators 14
- Ropes with Fibre Core (FC) 14
- Ropes with Steel Core (IWRC) 14

Technical Data

Ropes for Traction Drive Elevators 15-22
- Special Traction Ropes for Smaller Diameters NEW! STX 15-16
- DRAKO 6 x 19 – FC 17
- DRAKO 8 x 19 – FC 18
- DRAKO 210 TF 8-Strand Steel and Fibre Core Rope NEW! 210 TF 19
- DRAKO 250 T 8-Strand Steel Core Rope 19
- DRAKO 300 T 9-Strand Steel Core Rope 20
- DRAKO 300 TX 9-Strand Steel Core Rope 21
- Special Compensating Ropes
- DRAKO 180 B and DRAKO 200 B 22

Governor Ropes 23-24
Ropes for Roped Hydraulic Elevators 25-26
- DRAKO 6 x 19 – FC 25
- DRAKO 250 H 8-Strand Steel Core Rope 26
- DRAKO 300 H 9-Strand Steel Core Rope 26

Maintenance of Ropes

Maintenance-Lubrication for Elevator Ropes 27
Wire Rope Tensioning Device 28
Weight watcher – the mobile rope load measurement 28
Technical References 29

Rope Terminations

Ferrule Secured Thimble with Eye Bolt 30
Swaged Fitting with Thread 31
Symm. Wedge Socket with Eye Bolt 32
Asymm. Wedge Socket 33
Eye Bolts, Wire Rope Grips 34
Springs for Rope Terminations 35
Elastomer Spring Buffers for Rope Terminations 35

Service

General Services 36
Delivery Programme 37
Ways of Dispatch 38
Warnings 38
Order Form 39

About Wire Ropes

Definitions, Designation and Classification

The new European Rope Standards EN 12385-2 (with the above title), EN 12385-5 (Stranded Ropes for Lifts) and EN 12385-1 (General Requirements) show some new requirements, we have to learn to come along with.*

F. i. in the certificate, which has to accompany the rope delivery, it is required, to comply for the rope designation with the symbols, laid down in EN 12385-2. These symbols – derived from English words – are the same for all European deliveries.

Symbols for rope cores

FC = fibre core
NFC = natural fibre core
SFC = synthetic fibre core
IWRC = independant wire rope core
PWRC = parallel laid fullsteel rope

Symbols for strand construction

S = strand construction Seale
W = strand construction Warrington
F = strand construction Filler or Filler Wire
WS = strand construction Warrington-Seale
M = strand construction Crosslay

You can order as accustomed. Especially our Special Ropes are to be ordered as in the past by their name, f.i. DRAKO 300 T.

Rope class

So far each rope construction is governed by rope standards. In the new rope standards similar rope constructions in so-called rope class are summarised, e.g. the rope constructions 6 x 19 Seale, 6 x 19 Warrington and 6 x 19 Filler in the rope grade 6 x 19. The rope standards contain tables with the technical data of the common rope grade.

Rope tensile strength grade

For ropes acc. to EN 12385-5 the rope grade adresses the nominal tensile strength grades of the outer and inner wires of the rope. Additionaly, the rope grade defines the minimum breaking force of this rope. Rope grade 1570 (without the unit N/mm^2) means, that all wires of this rope are of the nominal tensile strength grade 1570 N/mm^2. Rope grade 1370/1770 means, that this is a dual tensile rope (term of ISO 4344) and that the outer wires of the outer strands are of 1370 N/mm^2 and the inner wires of the rope are of 1770 N/mm^2 nominal tensile strength grade.

Symbols for wire finish

U = bright (from uncoated)
B = galvanized acc. class B

Symbols for type of lay

sZ = right hand ordinary (or regular) lay
zS = left hand ordinary (or regular) lay
zZ = right hand lang lay
sS = left hand lang lay

These symbols have to be used for the standardized rope designation in the rope certificate:

Example

13 8 x 19 S – NFC 1370/1770 U sZ

- nominal rope Ø 13 mm
- 8 strands
- 19 wires per strand
- strand construction Seale
- naturel fibre core
- rope grade
  here: dual tensile
  outer wires: 1370 N/mm^2
  inner wires: 1770 N/mm^2
- wire finish: bright
- lay: ordinarylayright hand

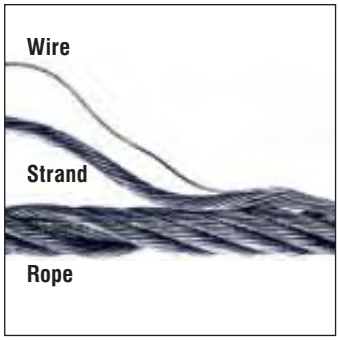
Aurora Tower Taiwan,
Schindler Management AG

***General references:** The rope standards mentioned in this catalogue are those valid at the time of printing (10/2007).

Elevator Rope Construction

Elevator Ropes

All DRAKO elevator ropes are DRAKO-made. Ropes with fibre core can easily be identified by the DRAKO-identification label (orange coloured synthetic wire in the fibre core).



Strands

Strands consist of one or more layers of wire, which are closed in a helix around the center wire.

Wires

Wires for elevator ropes are different from those for crane ropes a. s. o. Therefore we order only wires from wire mills nearby, which have qualified as suppliers of stable quality since many years.

Nominal tensile strength grade of wires

The nominal tensile strength grade in Germany is usually 1570 N/mm^2. Reasonably, the international standard for lift ropes, ISO 4344 as well as the USA, Japan and many European countries know and use elevator ropes of dual tensile rope grade. To come along with sheaves of often minor quality, the outer wires are then of lower tensile strength grade.

DRAKO produces for the very different requirements of German and foreign customers ropes in dual tensile rope grade with a variety of tensile strength combinations. Ropes for roped hydraulic elevators are preferably supplied with rope grade 1770.

Cores

Two types of cores are used in the elevator industry depending on the application: the fibre core, made of natural or synthetic fibre, and the steel wire core, i. e. an independent wire rope core (IWRC).

Because of their elasticity, ropes with fibre core adapt themselves within certain limits to the shape of the corresponding groove. Natural fibre cores (made of sisal-yarn) have a better storage capacity for the lubricant than synthetic fibre cores. But in any case, the lubricant in the fibre core is only sufficient for the lubrication and impregnation of the fibre core itself.

We produce the fibre cores for our elevator ropes in our own factory, the only way, to fulfil the high requirements of our works standard in regard of uniformity and stable lubricant content.

Synthetic fibre cores offer the advantage of an exactness in diameter and form-stability and are also rot resistant in humid environs.

The IWRCs increase the metallic area and thereby reduce the tensile stress in the cross section. Consequently ropes with a steel wire core show a reduced stretch under the same load compared to ropes with fibre core.

Direction of Lay

Only in very special cases – f. i. unguided or only wire guided counter-weight – it should be considered to take right and left hand lay ropes. The influence of the rope torque on the guiding forces of normal elevators with guide rails is extremely small. It should be much more important to have a set of ropes out of one production length (left hand and right hand can't be out of one production run).

Burj Dubai,
Otis L.L.C. - U.A.E.

Quality

As we are specialized on the production of elevator ropes, we are accustomed to produce these ropes in big production lengths on one purpose production lines with a very experienced staff of workers. This is one of the reasons for the high and equal level of DRAKO elevator rope quality.

Testing

All elevator ropes run through a testing procedure, which was developed especially for DRAKO elevator ropes. Here they are checked in whole length continuously in respect of diameter, of irregularities in material and closing. By this it is ensured that every production length corresponds to the special requirements of the DRAKO quality standard.

Tolerances of Rope Diameter

The tolerances of elevator-rope diameters have to be much smaller than for other ropes. The reason for this smaller tolerances is to ensure the exact interfit between the rope and the sheave groove to obtain enough traction but also to achieve best durability of rope and sheave.

According to EN 12385-5 and ISO 4344 the following new standard diameter tolerances are valid for elevator ropes

Rope construction				**Rope diameter tolerance in % of nominal rope diameter**		
Application	Core type	Rope grade	Nominal rope diameter mm	Max. unloaded	Minimum	
					Loaded with 5% F_{min}*	Loaded with 10% F_{min}*
Traction drive ropes Governor ropes	Fibre core	6 x 19 – FC 8 x 19 – FC	≤ 10	6	1	0
			> 10	5	1	0
	Steel core	6 x 19 – IWRC 8 x 19 – IWRC 9 x 19 – IWRC	≤ 10	3	0	1
			> 10	2	0	1

* F_{min} = minimum breaking force of the rope

Rope construction				**Rope diameter tolerance in % of nominal rope diameter**	
Application	Core type	Rope grade	Nominal rope diameter mm	Minimum	Maximum
Ropes for roped hydraulic elevators and compensating ropes	Fibre core	6 x 19 – FC 6 x 36 – FC 8 x 19 – FC	≤ 8	0	6
	Steel core	6 x 19 – IWRC 8 x 19 – IWRC 9 x 19 – IWRC	> 8	0	3

This shows, that the diameter tolerances of DRAKO elevator ropes are equal to or smaller than those of the new European Standard EN-12385-5, especially, the international norm ISO 4344.

The observation of an exact rope diameter has a considerable influence on the service life of an elevator rope.

For traction elevators the following facts are valid:
The service life of the rope becomes the greater,

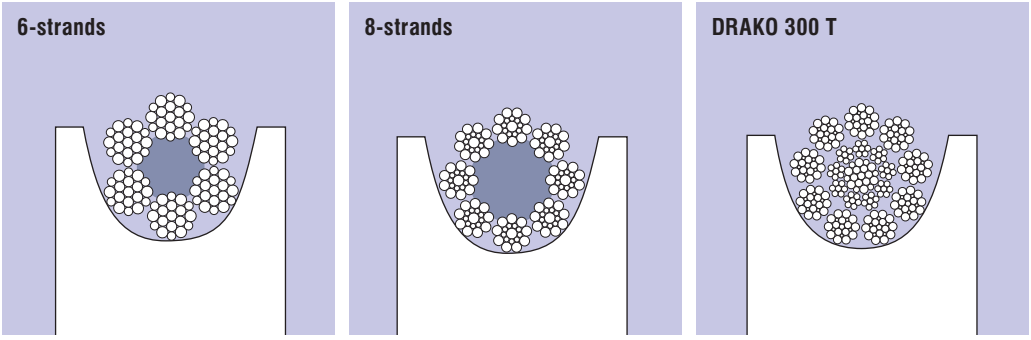
1. the better rope diameter and sheave radius conform with each other,
2. the fewer the rope diameter decreases during operation,
3. the more uniform the rope diameter remains over the whole rope length of an elevator.

The points 1–3 are valid for U-grooves, point 2 and 3 also for V-grooves.
A set of ropes is to be taken from the same production length.

Contact between Rope and Groove

Ropes are not a plain rod with a circular cross section; in fact they appear to be of polygonal cross section. Therefore the ropes touch the groove only at individual points. It can be only an advantage for the contact rope to groove, when the rope has more than 6 strands.

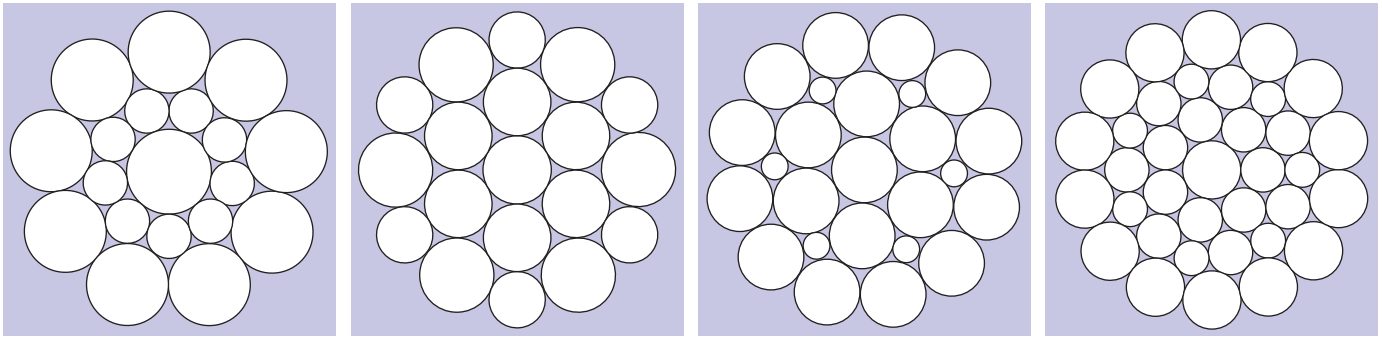
The success of our 9-strand DRAKO 300 T rope seems to give evidence, that this assumption is valid.



Strand Constructions

Here are information why certain strand and rope constructions are better qualified for specific applications in elevators.

For rope users, who don't want to be involved so deeply in rope technology, and only want to find simply the best rope for their purpose, there is a special printed matter as selection-guidance available.
Please ask for it or look at **www.drako.de**.



Seale

The most common strand construction for elevator ropes worldwide is Seale (1-9-9). This has at least the following reason:

Elevator ropes are known to get abrasion in usage and the big outer wires of Seale have a big metallic area to be abrased before the wires will break.

Warrington

Whenever a comparison of fatique bending life of ropes on sheaves with round groove is made, ropes of Warrington strands are beating Seale ropes with 20 to 40% more lifetime. This is due to more and smaller wires per strand. It must be taken into account that in elevators here is not only abrasion but also a lot of fatique bending. Especially in elevators with double wrap drives or in roped hydraulic elevators the latter is more important. So in UK and Germany we find both: Seale and Warrington as constructions for strand elevator hoist ropes.

Filler (Filler wire construction)

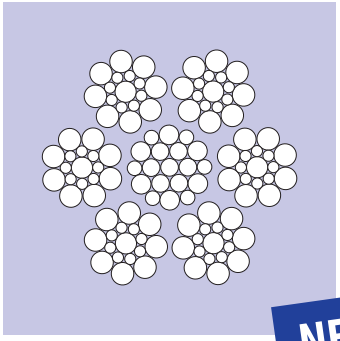
Filler wire strand construction is an especially fatique bending withstanding wire configuration. This is covered by the fact that f. i. the rope 8 x 21 Filler wire + fibre core (strand) is part of the Canadian elevator rope standard. Suspension ropes, bigger in diameter than 16 mm (5/8″) with 6 to 9 outer strands should have at least Filler wire strands because of better flexibility. This especially refers to 6-strand ropes. The disadvantages of this strand construction are: very vulnerable to geometry distortion, especially, when the Filler wire itself has not the nominal diameter. So the recommendation is given not to take Filler wire strands for ropes below 10 mm diameter.

Warrington-Seale

Ropes of Warrington-Seale construction are normally not suitable for suspension and governor ropes. But compensating ropes up from 24 mm and suspension ropes up from 22 mm are not flexible enough with the accustomed strand constructions. This is reason enough for DRAKO to recommend beyond these limits Warrington-Seale constructions with more than just 25 wires.

Rope selection

Ropes for Traction Drive Elevators
Spezial Traction Ropes for Smaller Diameters



NEW!

DRAKO STX

➜ see page 15

Steel-core rope with 6 outer strands in reliable Seale-construction for rope diameter of 6 mm and downwards. Through using high-tensile-grade steel wires with nominal grade of 1960 N/mm² the diameters of rope and traction sheave will be lowered so that the driving torque needed will be reduced essentially, holding the diameter ratio between traction sheave and rope constant.

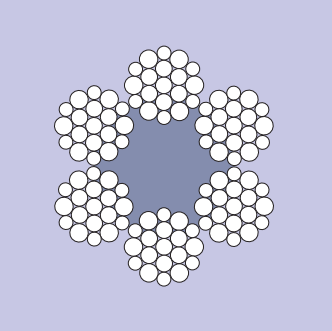
Advantages
- High breaking force
- Low elastic and permanent elongation
- Low rope diameter reduction under load
- Durable round form of rope and suitable for the use of form grooves.

D/d ≤ 40

Application:
Ideal for elevators with small and medium-sized shaft height, highly requiring stop accuracy and the smallest traction sheave diameter with D/d ≤ 40.

Please note:
Rope terminations must be secured against rotation. For greater shaft heights: ropes should be prevented from untwisting whilst installation. At rope replacement, the grooves of the drive sheave should be checked (guage).
Ropes in service are to be relubricated with a suitable lubricant at regular intervals.

Ropes for Traction Drive Elevators
Ropes with Fibre Core (FC)



DRAKO 6 x 19 NFC (natural fibre core)

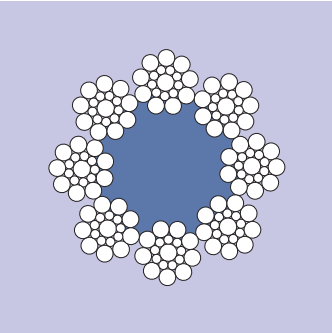
➜ see page 16

Example:
DRAKO 6 x 19 Warrington – NFC

Advantages
- big metallic cross-section, i. e. high breaking force compared to diameter,
- relatively small permanent and elastic elongation,
- low price per meter.

Application
- for low duty elevators

Please note
These ropes are generally not suitable for grooves with big undercuts.



DRAKO 8 x 19 NFC (natural fibre core)

➜ see page 18

Example:
DRAKO 8 x 19 Seale – NFC

Advantages
- rounder than 6-strand ropes, i. e. more contact points rope to groove,
- deformable in cross-section: i. e. the new rope adapts a little bit to-slightly worn out grooves,
- wires smaller in diameter: i. e. flexible, good fatigue bending characteristics,
- medium price per meter.

Application
The rope construction 8 x 19 Seale – NFC, see drawing, is without doubt the worldwide most common traction drive suspension rope. But also the rope construction 8 x 19 Warrington – NFC has its market share in Germany and UK due to better fatique bending properties.

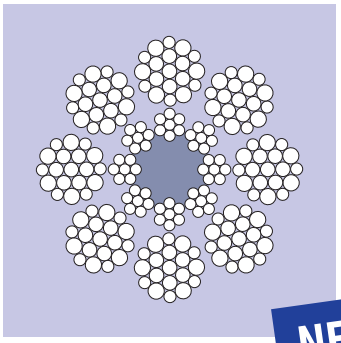
Anyway, 8-strand ropes with natural fibre core are the best solution for the normal traction drive elevator.

To make correct rope installation easier, especially on high rise installations, DRAKO 8 x 19 S-NFC are produced with a double yellow marking line. Traction ropes DRAKO 8 x 19 W-NFC therefore are produced with a single yellow marking line.

Please note
The rope quality of this rope construction depends on the quality of the fibres and the resulting fibre core. This is the reason, why DRAKO is only using DRAKO-made fibre cores.

As the elevator industry is using ropes for very different purposes, these ropes consequently differ in their construction, their lubrication and their rope grades.

Ropes for Traction Drive Elevators
Rope with Steel and Fibre Core



NEW!

DRAKO 210 TF

➜ see page 19

Steel-core rope with 8 outer strands and a combination of steel and fibre core. This special traction rope offers an intended, slightly increased transverse elasticity by the combined steel and fibre core for adjustment to special groove requirements and slightly worn-out grooves. Through the fibre core the additional lubricant-storage capacity is increased.

Advantages

- Big metallic cross-section, i. e., high breaking force compared to rope diameter
- Slightly deformable cross-section
- Good fatigue bending performance towards slight deflections
- Low permanent and elastic elongation

Application

Special traction rope for more strongly frequented elevators

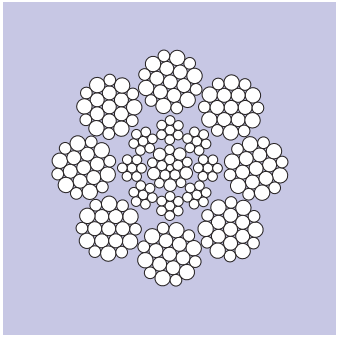
Please note

Rope terminations must be secured against rotation. For greater shaft heights: ropes should be prevented from untwisting whilst installation. At rope deplacement, the grooves of the drive sheave should be checked (guage).

Ropes in service are to be relubricated with a suitable lubricant at regular intervals. The combined steel and fibre core does not replace the function of relubricant.

The relatively higher rope transverse elasticity does not substitute the re-work when ropes are discarded, nor does it substitute the replacement of traction sheaves.

Ropes for Traction Drive Elevators
Ropes with Steel Core (IWRC)



DRAKO 250 T the 8-strand steel core rope

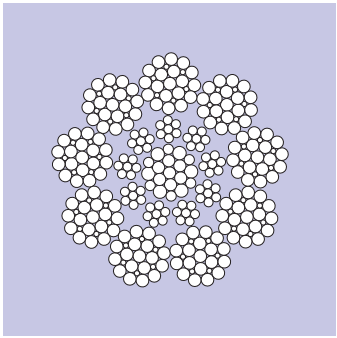
➜ see page 19

Example:
DRAKO 250 T

Advantages
- rounder than 6-strand ropes,
- flexible, i. e. good fatigue bending characteristic,
- low permanent and elastic elongation,
- low reduction in diameter,
- high breaking force compared to diameter,
- remains round: good for wide undercuts.

Application
Ideal for the medium duty elevator, requiring only minimum maintenance.

Please note
Rope terminations must be secured against rotation. For greater shaft heights: ropes should be prevented from untwisting whilst installation. At rope replacement, the grooves of the drive sheave should be checked (gauge).
To make correct rope installation easier, especially on high rise installations, DRAKO 250 T are produced with a double blue marking line.



DRAKO 300 T the 9-strand heavy duty rope

➜ see page 20

Example:
DRAKO 300 T

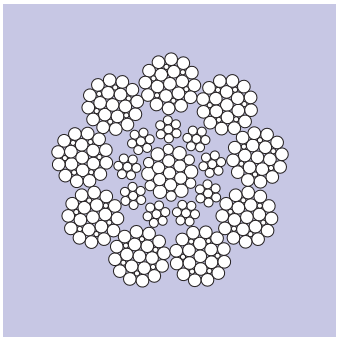
This rope has been probably the first elevator rope in the world with a steel core (IWRC). It has been designed in 1955 by DRAKO. After this rope beeing nationally and internationally successful in demanding building projects, ropes with steel core are now also implemented in the relevant European and ISO-standards.

Advantages
- very round cross-section, i. e. small pressure in the groove,
- many wires, i. e. flexible, very good fatigue bending life. One of the reasons is, that due to the special configuration of the wires in the strands and of the strands in the rope, wire crossings are avoided. Therefore the possibility of inner nonvisible wire breaks is reduced.
- small permanent and elastic elongation. Result: the car is better connected to the machine (important in high shafts) and it is easier to approach the floors correctly.

Application
DRAKO 300 T is the most efficient solution as suspension rope for high and very high elevators and for all traction drive elevators with many deflection sheaves.

Please note
Rope terminations must be secured against rotation. For big shaft heights: ropes should be prevented from untwisting whilst installation. The single blue marking line along the rope enables to control and to rectify this.
At rope replacement, the grooves of the drive sheave should be controlled (gauge).

Ropes for Traction Drive Elevators
Ropes with Steel Core (IWRC)



DRAKO 300 TX the 9-strand heavy duty rope for extreme applications

➜ see page 21

Example:
DRAKO 300 TX

This rope is similar in design to DRAKO 300 T but consists of selected high tensile strength grade wires (rope grade 1960) and has an extraordinary high minimum breaking force.

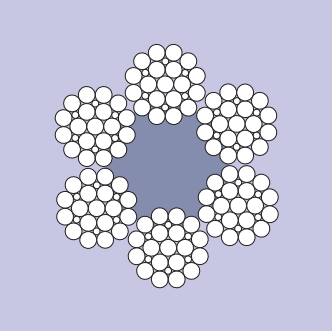
The rope thus exeeds the specifications of EN 81-1 and the scope of EN 12385-5 (maximum rope grade 1770).

DRAKO is offering this rope to the customers as we foresee the need for such a product in connection with the increasing number of extra high elevators within the next decade, where the properties of conventional elevator ropes will not be sufficient. The breaking force of this rope is more than 20 % higher than the breaking force of DRAKO 300 T.

Application
The features of this rope are beyond the standard. The product is designed for those elevators, where conventional ropes cannot be used, due to their unit weight.

Please note
When planning installation with this rope type, please contact us in advance. Also this rope comes with a marking line along the rope for easy installation.

Ropes for Traction Drive Elevators
Compensating Ropes



DRAKO 180 B / 200 B

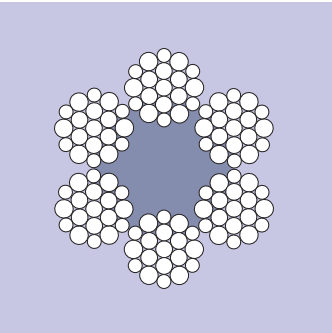
➜ see page 22

The purpose and the operating conditions to which compensating (balance) ropes are exposed, differ considerably from those of the suspension ropes used in the same elevator. DRAKO therefore recommends the use of specially designed compensating ropes. More lubricant and a different fibre core as well and additional selection of bigger rope diameters (for less ropes) and flexible rope constructions, adjusted to the rope diameter result in a longer fatique life, smooth running and improved length stability.

But in future it will still be possible to get from DRAKO suspension and compensating ropes from the same type.

For information about balance chains, see Catalogue "Compensation".

Overspeed Controller
Governor Ropes



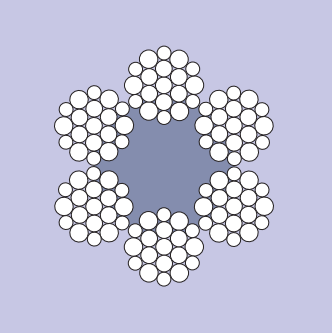
DRAKO 6 x 19 / 8 x 19 – FC – IWRC

➜ see page 23 and 24

These ropes are important functional components of the overspeed controller and the safety gear. The force is thereby transmitted mainly by friction. So it is essential, that the lubrication of governor ropes is carefully dosed.

Since the introduction of safety gears for both directions, governor ropes with higher breaking forces are required, which can be achieved by bigger rope diameters, by the use of higher rope grades or by full steel ropes. DRAKO offers all these possibilities.

Ropes for Roped Hydraulic Elevators
Ropes with Fibre Core (FC)



DRAKO 6 x 19 FC

➜ see page 25

Example:
DRAKO 6 x 19 Warrington – FC

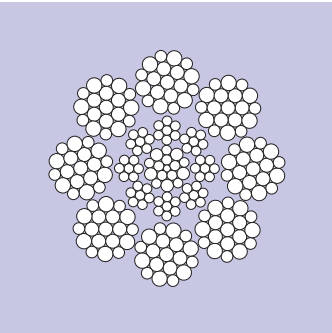
Advantages
- big metallic area, i.e. high breaking force in relation to the ropediameter,
- relatively low permanent and elastic elongation,
- low price per meter.

As only sheaves with round grooves are common in such elevators, ropes of rope grade 1770 with the resulting breaking force advantage can also be used. Carefully dosed ample lubrication results in reduced maintenance costs and extended fatigue life of the rope.

Application
Highly suitable for elevators of average usage, whereby rope grade 1770 is recommended.

Please note
This rope is not suitable for traction drive elevators.

Ropes with steel core (IWRC)



DRAKO 250 H the 8-strand full steel rope

➜ see page 26

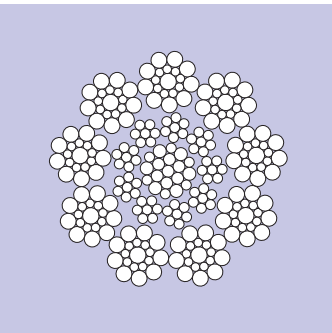
Example:
DRAKO 250 H

Advantages
- rounder than a 6-strand rope,
- flexible, with good fatigue bending properties,
- low permanent and elastic elongation,
- low rope diameter reduction in loaded condition, also after long periods,
- high breaking force in relation to diameter (full steel rope),
- rope grade 1770 leads to very high breaking force.

As ropes for roped hydraulic elevators do not have to fullfil specific requirements with regard to friction, this rope has a carefully dosed ample lubrication, which ensures excellent fatigue bending properties.

Application
Ideal for the heavy duty roped hydraulic elevator, requiring only minimum maintenance.

Please note
Rope terminations must be secured against rotation.
This rope is not suitable for traction drive elevators.



DRAKO 300 H the 9-strand full steel rope

➜ see page 26

Example:
DRAKO 300 H

Due to the 9 strands, consisting of many thin wires, this rope type is very flexible and has extraordinary high fatigue bending life. The big metallic area and rope grade 1770 lead to a high minimum breaking force with carefully dosed ample lubrication and low elongation this rope requires only small maintenance.

Application
Ideal for fast running drives with high usage and heavy loads.

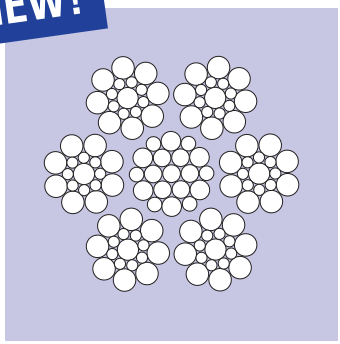
Please note
Rope terminations must be secured against rotation.
This rope is not suitable for traction drive elevators.

PFEIFER DRAKO

Ropes for Traction Drive Elevators
Special Traction Ropes for Smaller Diameters

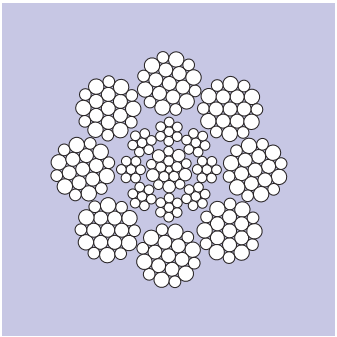
Characteristics	preformed, prestretched (medium), bright, right hand, ordinary lay
Please note	special traction ropes outside of EN 12385-5, EN 81-1, for D/d ≤ 40

NEW!



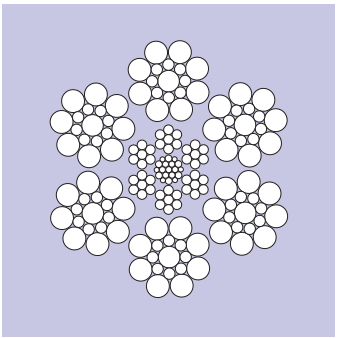
DRAKO STX

Nom. Rope diameter mm	Rope grades	Minimum breaking force F_{min} kN	Nominal length mass approx. kg/100 m	Metallic area approx. mm^2
4	1960	12,6	6,9	7,9
5	1960	20,0	10,9	12,5
6	1960	29,5	15,7	18,1



DRAKO 250 T

6	1770	26,8	16,4	18,5
6,5	1770	31,5	17,9	21,4



DRAKO 233 T

8	1770	43,1	26,0	30,0

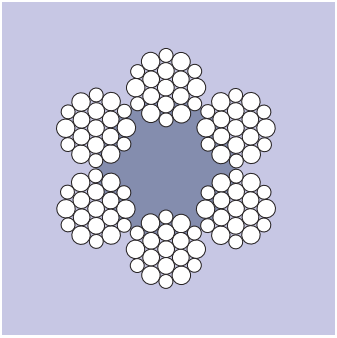
For further information please contact us.

Elevator ropes will be supplied with servings on both ends, if not specified otherwise.

Accessories, such as fitting with thread and symmetric wedge socket, are available and can be inquired.

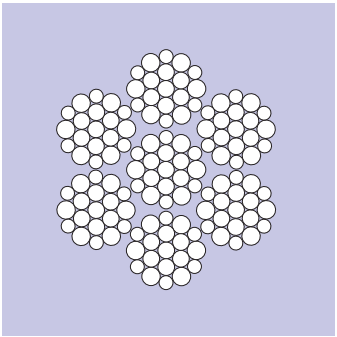
Ropes for Traction Drive Elevators
Special Traction Ropes for Smaller Diameters

Characteristics	preformed, prestretched (medium), bright, right hand, ordinary lay
Please note	special traction ropes outside of EN 12385-5, EN 81-1, for D/d ≤ 40



DRAKO 6 x 19 W – FC

Nom. Rope diameter mm	Rope grades	Minimum breaking force F_{min} kN	Nominal length mass approx. kg/100 m	Metallic area approx. mm^2
6	1960	24,7	13,2	14,5



DRAKO 6 x 19 W – WSC

6	1960	29,0	14,5	17,9

Elevator ropes will be supplied with servings on both ends, if not specified otherwise.

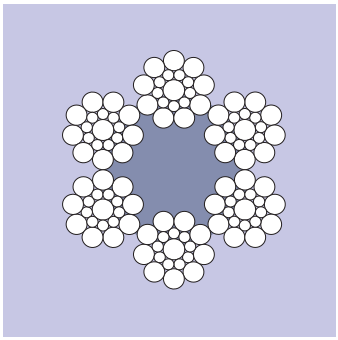
Accessories, such as fitting with thread and symmetric wedge socket, are available and can be inquired.

Ropes for Traction Drive Elevators
DRAKO 6 x 19 – FC 6-Strand Suspension Ropes

Rope diameter

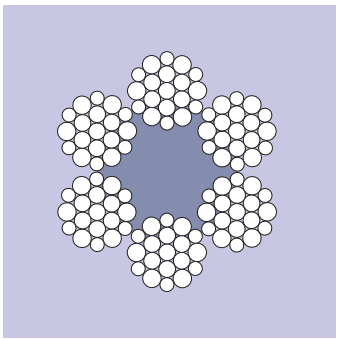
6,0 – 6,5 mm and smaller: synthetic fibre core (SFC)
8 mm and bigger: natural fibre core, Sisal (NFC), SFC on request

Characteristics	preformed, prestretched (medium), bright, right hand, ordinary lay. Lang lay on request
Rope grades available	1570 and 1370/1770
Rope diameter tolerance	see page 6



DRAKO 6 x 19 S – FC

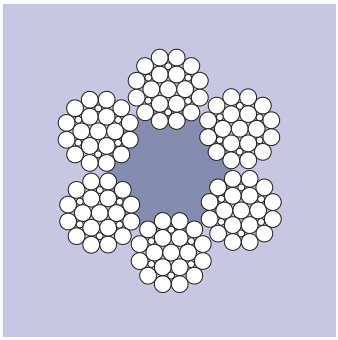
Nom. Rope diameter mm	Minimum breaking force F_{min} 1570 and 1370/1770 kN	Nominal length mass approx. kg/100 m	Metallic area approx. mm^2
6	19,0	13,0	13,8
6,5*	22,2	15,2	16,2



DRAKO 6 x 19 W – FC

5[1)]	13,7	9,2	9,9
6	19,8	13,2	14,3
6,5*	23,2	15,5	16,8
8*	35,1	23,6	25,4
9,5	49,5	33,2	35,9
10*	54,9	36,8	39,7
11*	66,4	44,5	48,1
13*	92,8	62,2	67,2
14	108	72,1	77,9
16*	141	94,2	102

[1)] for small goods elevators



DRAKO 6 x 25 F – FC

13*	95,7	63,3	69,3
16*	145	95,9	105
19*	204	135	148

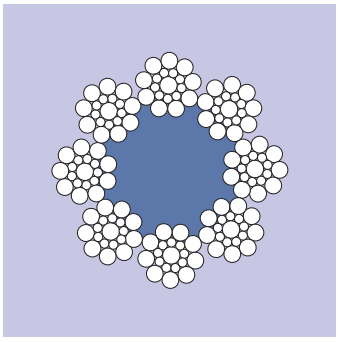
* Preferred diameters, see rope standard EN 12385-5, stranded ropes for lifts and ISO/DIS 4344

Elevator ropes will be supplied with servings on both ends, if not specified otherwise.

Ropes for Traction Drive Elevators
DRAKO 8 x 19 – FC 8-Strand Suspension Ropes

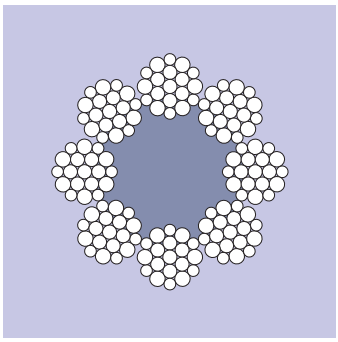
With natural fibre core, Sisal, (NFC), synthetic fibre core (SFC) on request

Characteristics	preformed, prestretched (medium), bright, right hand, ordinary lay. Lang lay on request
Rope grades available	1570 and 1370/1770
Rope diameter tolerance	see page 6



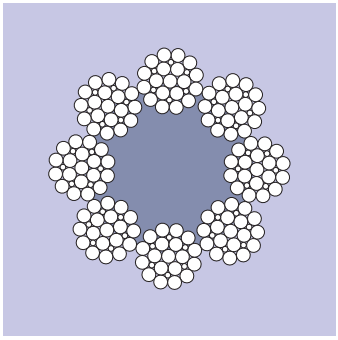
DRAKO 8 x 19 S – FC

Nom. Rope diameter mm	Minimum breaking force F_{min} 1570 and 1370/1770 kN	Nominal length mass approx. kg/100 m	Metallic area approx. mm^2
8*	30,4	21,5	22,5
9	38,4	27,3	28,4
9,5	42,8	30,4	31,7
10*	47,4	33,7	35,1
11*	57,4	40,7	42,5
12	68,3	48,5	50,6
13*	80,2	56,9	59,3
14	93,0	66,0	68,8
15	107	75,7	79,0
15,5	114	80,8	84,4
16*	121	86,1	89,9
18	154	109	114
19*	171	121	127



DRAKO 8 x 19 W – FC

8*	31,6	22,2	23,4
9	40,0	28,1	29,6
10*	49,4	34,7	36,5
11*	59,7	42,0	44,2
12	71,1	50,0	52,6
13*	83,4	58,6	61,7
16*	126	88,8	93,5



DRAKO 8 x 25 F – FC

13*	84,4	58,9	62,5
15	112	78,4	83,3
16*	128	89,2	94,7
18	162	113	120
19*	180	126	134

* Preferred diameters, see rope standard EN 12385-5, stranded ropes for elevators

To make correct rope installation easier, especially on high rise installations, DRAKO 8 x 19 S are produced with a double yellow marking line, DRAKO 8 x 19 W are produced with a single yellow marking line.

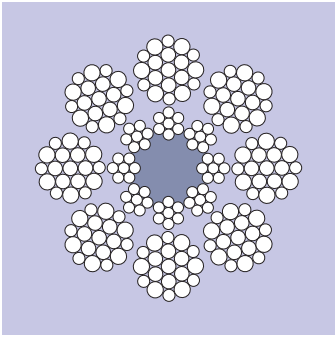
Elevator ropes will be supplied with servings on both ends, if not specified otherwise.

Ropes for Traction Drive Elevators

DRAKO 210 TF – 8-Strand Steel and Fibre Core

NEW!

Characteristics	preformed, prestretched (medium), bright, right hand, ordinary lay
Rope grades available	1570
Rope diameter tolerance	see page 6



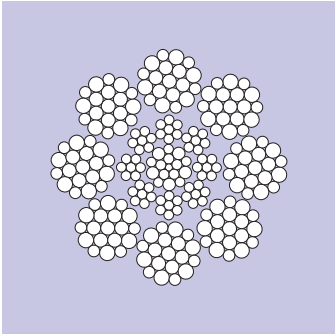
Nom. Rope diameter mm	Rope grades	Minimum breaking force F_{min} kN	Nominal length mass approx. kg/100 m	Metallic area approx. mm^2
8	1570	40,0	0,25	28,5
10	1570	61,3	0,39	44,5
11	1570	76,1	0,47	53,8
12	1570	88,3	0,56	64,1
13	1570	106	0,66	75,2
15	1570	137,0	0,86	99,0
16	1570	156	1,00	113,9

Elevator ropes will be supplied with servings on both ends, if not specified otherwise.

Accessories, such as fitting with thread and symmetric wedge socket, are available and can be inquired.

DRAKO 250 T – 8-Strand Steel Core Rope

Characteristics	preformed, prestretched (medium), bright, right hand, ordinary lay
Rope grades available	1570
Rope diameter tolerance	see page 6



Nom. Rope diameter mm	Minimum breaking force F_{min} kN	Nominal length mass approx. kg/100 m	Metallic area approx. mm^2
8*	43,3	27,1	31,6
9	54,8	34,3	40
10*	67,7	42,3	49,4
11*	81,9	51,2	59,7
12	97,4	60,9	71,1
13*	114	71,5	83,4
14	133	82,9	96,7
16*	173	108	126

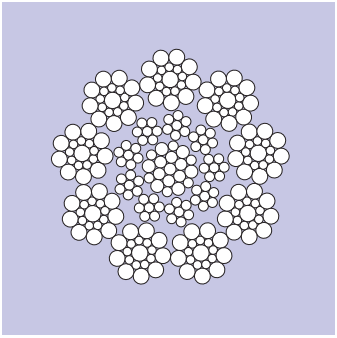
To make correct rope installation easier, especially on highrise installations, DRAKO 250T are produced with a double blue marking line.

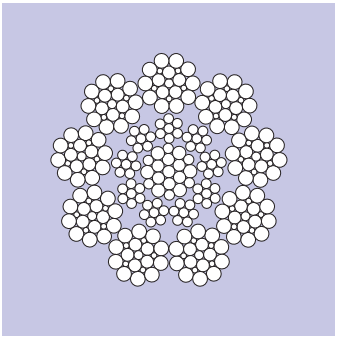
Elevator ropes will be supplied with servings on both ends, if not specified otherwise.

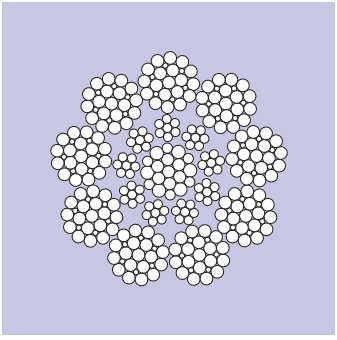
Ropes for Traction Drive Elevators
DRAKO 300 T – 9-Strand Steel Core Rope

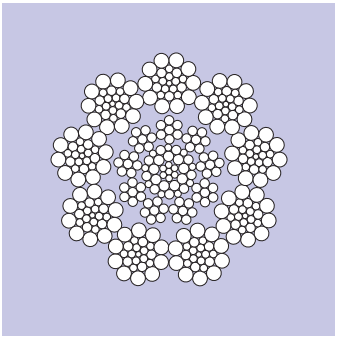
The strand construction of DRAKO 300 T is dependent on the rope diameter to optimize fatique bending performance and wear resistance

Characteristics	preformed, prestretched (medium), bright (galvanized on request, in some diameters ex stock), right hand (left hand on request), ordinary lay
Rope grades	1570
Rope diameter tolerance	see page 6









Nom. Rope diameter mm	Minimum breaking force F_{min} 1570 kN	Nominal length mass approx. kg/100 m	Metallic area approx. mm^2
8*	42,1	26,1	30,8
9	53,3	33,1	39,0
9,5	59,4	36,8	43,5
10*	66,0	42,8	49,7
11*	79,9	51,8	60,1
12	95,1	61,6	71,6
13*	111,6	72,3	84,0
14	133	84	96,6
15	153	96	110,9
15,5	163	103	118,4
16*	174	110	126,2
17,5	208	131	151,0
18	220	139	159,7
19*	245	154	178,0
20	272	171	197,2
22*	333	215	243,5

* Preferred diameters, see rope standard EN 12385-5, stranded ropes for elevators.

To make correct rope installation easier, especially on highrise installations, DRAKO 300 T ropes are produced with a single blue line along the rope. If the ropes have untwisted whilst beeing installed, the blue line enables, to correct it.

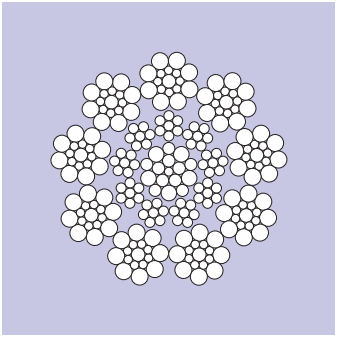
Elevator ropes will be supplied with servings on both ends, if not specified otherwise.

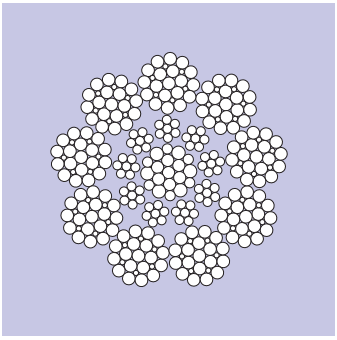
Ropes for Traction Drive Elevators

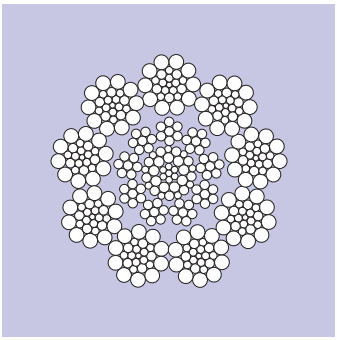
DRAKO 300 TX – 9-Strand Steel Core Rope for Super High Rise Traction Drive Elevators

The strand construction of DRAKO 300 TX is dependant on the rope diameter to optimize fatique bending performance and wear resistance.

Characteristics	preformed, prestretched (medium), bright, right hand, ordinary lay
Rope grades available	1960 Please note: This rope is outside of the framework of EN 81
Rope diameter tolerance	maximum: unloaded +3 %, minimum: loaded with 10 % F_{min} = – 1 %







Nom. Rope diameter mm	Minimum breaking force F_{min} 1960 kN	Nominal length mass approx. kg/100 m	Metallic area approx. mm^2
5	19,2	9,9	11,7
6	27,4	14,3	16,8
8*	49,0	25,4	30,0
9	63,5	32,2	38,9
10*	81,1	42,8	49,7
13*	136	72,3	83,3
16*	208	110	126
19*	303	154	185
22*	398	214	244

* Preferred diameters, see rope standard EN 12385-5, stranded ropes for elevators.

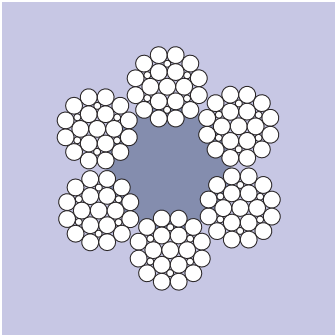
To make correct rope installation easier, especially on highrise installations, DRAKO 300 TX ropes are produced with a marking line along the rope. If the ropes have untwisted whilst beeing installed, the blue line enables, to correct it.

Elevator ropes will be supplied with servings on both ends, if not specified otherwise.

Ropes for Traction Drive Elevators
Special Compensating Ropes

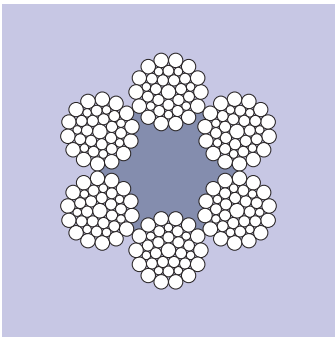
Special compensating ropes (balance ropes), to be used in tensioned application only. The rope construction varies with the nominal diameter to optimize the performance.

Characteristics	preformed, bright, right hand ordinary lay
Core	DRAKO 180 B and DRAKO 200 B are made with a fibre core (SFC)
Rope grades available	1370/1770 or 1570
Rope diameter tolerance	see page 6

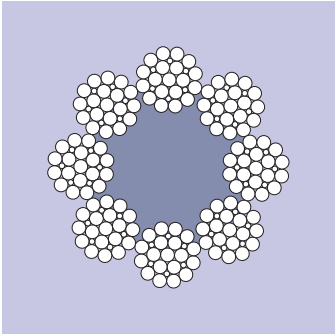


DRAKO 180 B

Nom. Rope diameter mm	Minimum breaking force F_{min} 1370/1770 or 1570 kN	Nominal length mass approx. kg/100 m
13	83,7	60,7
16	127	91,9
18	160	116
19	179	130
20	198	144
22	240	174



24	292	211
26	342	248
32	518	376
36	656	476
38	731	530



DRAKO 200 B

13	74,3	57,5
16	113	87,0
18	142	110
19	159	123
22	213	165

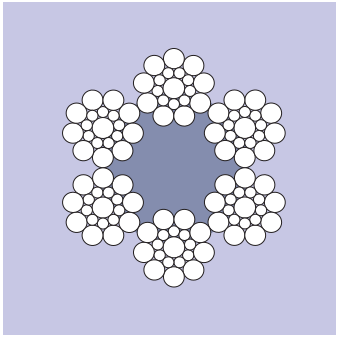
For more detailed information, see PFEIFER DRAKO Catalogue "Compensation".

Elevator ropes will be supplied with servings on both ends, if not specified otherwise.

Overspeed Controllers
Governor Ropes for Elevators

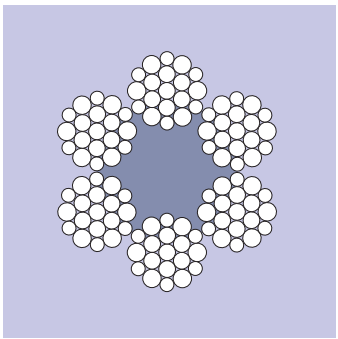
These ropes are less lubricated than suspension ropes.

Characteristics	preformed, prestretched, (medium), bright or galvanized, right hand, ordinary lay
Rope grades available	1370/1770, 1570, 1770, 1960
Rope diameter tolerance	see page 6



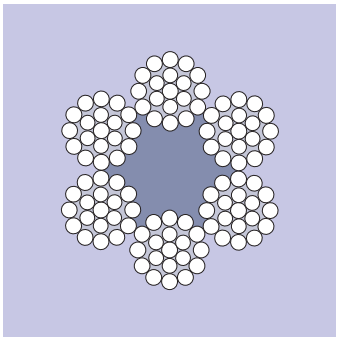
DRAKO 6 x 19 S – FC

Nom. Rope diameter	Minimum breaking force F_{min}				Nominal length mass approx.	Metallic area approx.
mm	1370/1770 kN	1570 kN	1770 kN	1960 kN	kg/100 m	mm^2
6	19	–	–	–	13	13,8
7	–	–	29,1	–	17,6	18,8
9	–	–	48,1	–	29,2	31,1



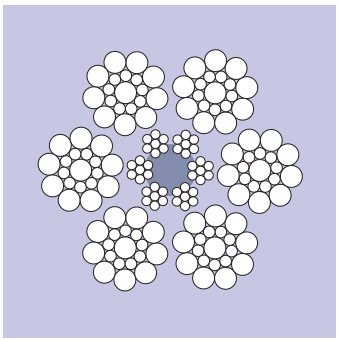
DRAKO 6 x 19 W – FC

6	–	19,8	22,3	23,7	13,2	14,3
6,3	–	–	24,6	27,2	14,6	15,8
6,5	23,2	23,2	26,2	27,8	15,5	16,8
7	–	–	30,3	–	18	19,5
8	–	–	39,6	–	23,6	25,4



DRAKO 6 x 19 M – FC

6	–	–	19,6	–	12,3	12,9
6,5	–	–	23,3	–	14,4	15,3
8	–	–	35,6	–	21,8	23,4



DRAKO 6 x 19 S – IWRC

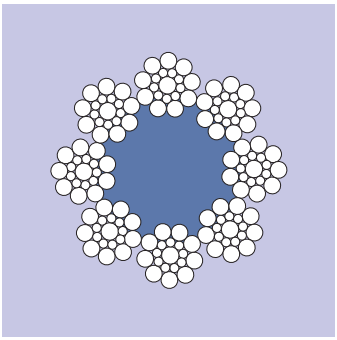
8	–	35,9	–	–	26,2	31,3

Elevator ropes will be supplied with servings on both ends, if not specified otherwise.

Overspeed Controllers
Governor Ropes for Elevators

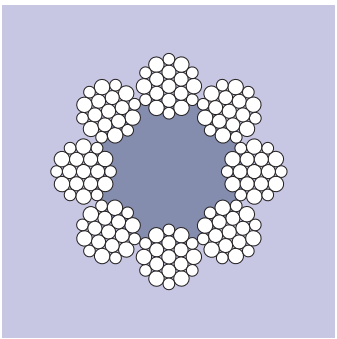
These ropes are less lubricated than suspension ropes.

Characteristics	preformed, prestretched, (medium), bright or galvanized, right hand, ordinary lay
Rope grades available	1370/1770, 1570, 1770, 1960[1)]
Rope diameter tolerance	see page 6



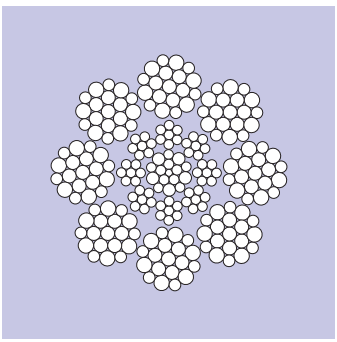
DRAKO 8 x 19 S – FC

Nom. Rope diameter	Minimum breaking force F_{min}				Nominal length mass approx.	Metallic area approx.
mm	1370/1770 kN	1570 kN	1770 kN	1960 kN	kg/100 m	mm^2
8	–	–	34,2	–	21,5	22,5
9,5	42,8	42,8	48,3	–	30,4	31,7
10	–	47,4	–	–	33,7	35,1
12,7	–	76,5	–	–	54,3	56,6



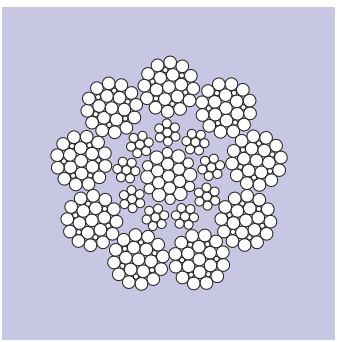
DRAKO 8 x 19 W – FC

6	–	–	35,6	–	22,2	23,4



DRAKO 250 T

6,5	–	28,6	–	–	17,9	20,9
8	–	43,3	–	–	27,1	31,6
9	–	54,8	–	–	34,3	40,0
10	–	67,7	–	–	42,3	49,4



DRAKO 300 T und TX[1)]

8	–	42,1	–	58,8	26,1	30,8
10	–	66,0	–	80,5	42,8	49,7
13	–	112,0	–	136,0	72,3	84,0

[1)] This rope only on request (1960)

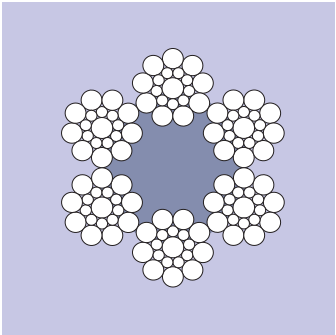
Elevator ropes will be supplied with servings on both ends, if not specified otherwise.

Ropes for Roped Hydraulic Elevators
Ropes with Fibre Core

Rope diameter

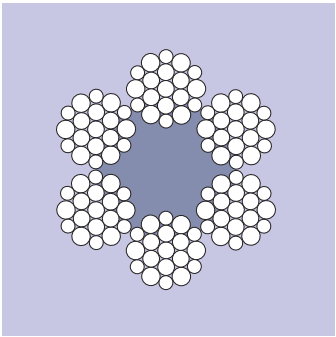
7,0 mm and smaller: synthetic fibre core (SFC)
8,0 mm and bigger: natural fibre core Sisal (NFC). SFC on request.

Characteristics	preformed, prestretched (heavy), bright, ordinary lay, right hand
Rope grades available	1770
Rope diameter tolerance	see page 6



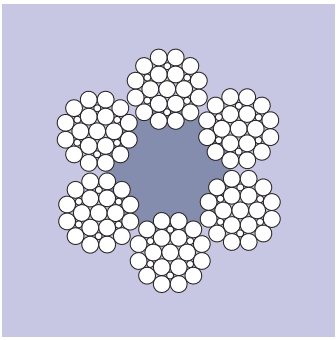
DRAKO 6 x 19 S – FC

Nom. Rope diameter mm	Minimum breaking force F_{min} 1770 kN	Nominal length mass approx. kg/100 m	Metallic area approx. mm^2
6	21,4	13,0	13,8
9	48,2	29,2	31,1
10*	59,5	36,0	38,4



DRAKO 6 x 19 W – FC

7	30,3	18,0	19,5
8*	39,6	23,6	25,4
10*	61,9	36,8	39,7
11*	74,9	44,5	48,1
12	89,1	53,0	57,2
13*	104,6	62,2	67,2
16*	158,5	94,2	102



DRAKO 6 x 25 F – FC[1)]

13*	108	63,3	69,3
16*	163	95,9	105

* Preferred diameters, see rope standard EN 12385-5, stranded ropes for elevators.
[1)] This rope only on request

Technical Data

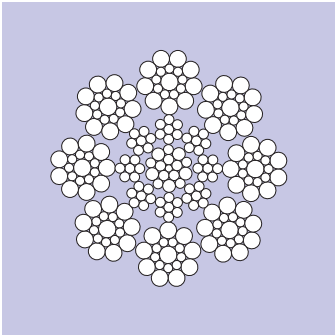
Elevator ropes will be supplied with servings on both ends, if not specified otherwise.

Ropes for Roped Hydraulic Elevators

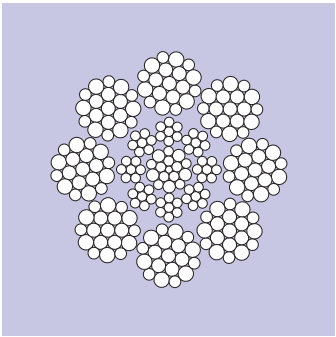
DRAKO 250 H – 8-strand rope with steel core for roped hydraulic elevators

This rope is not suitable for traction drive elevators!

Characteristics	preformed, prestretched (medium), bright, right hand, ordinary lay
Rope grades available	1770
Rope diameter tolerance	see page 6



Nom. Rope diameter mm	Minimum breaking force F_{min} 1770 kN	Nominal length mass approx. kg/100 m	Metallic area approx. mm^2
8*	46,7	27,6	31,4
9	58,9	34,9	39,4

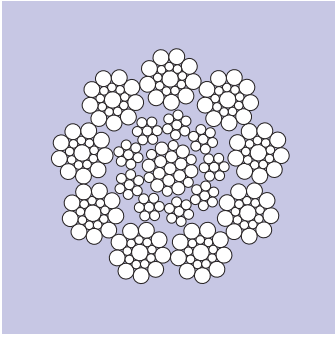


10*	72,7	43,1	48,8
11*	86,0	52,1	57,8
13*	126,0	72,8	83,7

DRAKO 300 H – 9-strand steel core rope for roped hydraulic elevators

This rope is not suitable for traction drive elevators!

Characteristics	preformed, prestretched (medium), bright, right hand, ordinary lay
Rope grades available	1770
Rope diameter tolerance	see page 6



Nom. Rope diameter mm	Minimum breaking force F_{min} 1770 kN	Nominal length mass approx. kg/100m	Metallic area approx. mm^2
8*	45,0	27,0	32,4
9*	57,5	35,0	40,5
10*	71,0	45,0	50,1
11*	82,0	52,0	58,5
13*	114,0	73,0	80,6

* Preferred diameters, see rope standard EN 12385-5, stranded ropes for elevators.

Elevator ropes will be supplied with servings on both ends, if not specified otherwise.

Maintenance-Lubrication for Elevator Ropes

DRAKO-elevator ropes are lubricated during manufacture to reduce corrosion and abrasion. But the applied quantity of lubricant is only sufficient enough to prevent elevators with a sharply calculated traction capability from slip.

As dust and abrasion diminish the lubricant this first lubrication will only in rare cases be efficient during the whole period of installation. So DRAKO recommend to re-lubricate elevator ropes periodically during service. Re-lubrication is not necessary as long as a finger wiped in a sheave groove shows a faint smudge and gives a slightly oily feeling. Re-lubrication can be done by spray-cans or by an oil-can, together with a paint-brush or something similar. For traction drives, only small quantities may be applied. Then the elevator should be run up and down the whole distance several times. The slipping characteristics are to be observed during this action. If necessary more lubricant can be applied. The lubricant should have low viscosity and good penetrating properties to lubricate also the inner parts of the rope.

For this purpose we recommend the DRAKO special rope lubricants **DRAKO-LUBE** or **DRAKO-SOL,** which are compatible with the basic lubrication. **DRAKO-Outdoor** as a further alternative has proven to be very worthwile in outdoor applications. It is similar like a paste and becomes liquid in process.

DRAKO-LUBE and **DRAKO-SOL** are of low viscosity and transparent. These lubricants are thus able to penetrate even the loaded rope. During standstills, the lubricant will creep back into the gaps between wires, from where it is expelled during operation.

A lubricant, except DRAKO-FLUID SF, contains solvents in general. Please ensure that the working area is properly ventilated.

DRAKO-FLUID SF, our recommended elevator rope lubricant is **solvent free** and thus f. i. suitable for use in **automatic lubrication equipment.**

Attention: The currently available automatic lubricaters may only be used at a specific elevator for a limited period of time to prevent excess lubrication and the related risk of rope slip.

Excessively lubricated ropes can be degreased with our special **DRAKO-FLORIDEAL** rope degreasing powder, which is chemically neutral.

Product	Form	Suitable for	Container Size	Solvent	to be used with
DRAKO-LUBE	liquid	indoor and outdoor	1,0-kg-can 2,5-kg-can 5,0-kg-can	Yes Yes Yes	Brush, paint roller
DRAKO-SOL	liquid	indoor	spray can 500 ml (12 cans = 1 delivery box)	Yes Yes	spray
DRAKO-FLUID SF	liquid	indoor and outdoor	1,0-kg-can 2,5-kg-can 5,0-kg-can	No No No	automatic lubrication equipment, brush, paint roller, squirt gun
DRAKO-Outdoor	liquid/pasty	outdoor	10-kg-can	Yes	Brush, paint roller
DRAKO-Florideal	Rope degreasing powder	indoor and outdoor	25-kg-bag 5-kg-plastic bucket	– –	Gloves

Weight watcher – the mobile rope load measurement

Mobile rope load measurement for up to 12 ropes

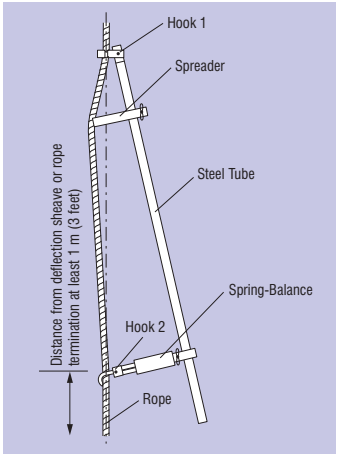
The rope-tension measuring system embodies a patented measuring principle. An individual load sensor is mounted at each rope. The system can be used with different rope types and diameters. The patented measuring principle allows not only the measurement of each rope-tension, it also enables you to set the optimum rope-tension very quickly and easily (integrated software-wizard).

Highlights:

- time saving rope tension setting
- simple weight determination of cab and counterweight
- rope load sensor LSM 1 with quick clamp device
- built-in wizzard for optimum rope tension setting
- suitable for use with different rope diameters and types Ø 6–16 mm
- no calibration with weight necessary
- 12 measuring channels for up to 12 ropes
- stores up to 100 measurements
- USB-port, Bluetooth (optional)
- big touch screen display with backlight
- a component of LiftPC® mobile diagnosis

Wire Rope Tensioning Device

- Equal rope tension adds to the life of the elevator ropes and the sheaves,
- light-weight design, easy to handle,
- comparable measured values for a set of ropes
- preferable for elevators of more than 50 m shaft height.
- The attached manual contains all relevant instructions on the use of the device and the assessment of measured values.



Technical References

Discard Criteria

The following table shows the discard criteria according to the elevator rope standards EN 12385 - 5 and ISO 4344

	Discard or examination within the time span prescribed by an expert			immediate discard		
Criteria	**Rope grade 6 x 19**	**Rope grade 8 x 19**	**Rope grade 9 x 19**	**Rope grade 6 x 19**	**Rope grade 8 x 19**	**Rope grade 9 x 19**
Average number of wire break among outer strands	More than 12 per length of lay	More than 15 per length of lay	More than 17 per length of lay	More than 24 per length of lay	More than 30 per length of lay	More than 34 per length of lay
Number of wire break predominantly in one or two strands	More than 6 per length of lay	More than 8 per length of lay	More than 9 per length of lay	More than 8 per length of lay	More than 10 per length of lay	More than 11 per length of lay
Number of wire break adjacent to another in one outer strand	4	4	4	More than 4	More than 4	More than 4
Intermediate wire break	1 per length of lay	1 per length of lay	1 per length of lay	More than 1 per length of lay	More than 1 per length of lay	More than 1 per length of lay

Reduction in rope diameter
The ropes should be replaced if the rope diameter is reduced by more than 6 per cent based on a rope nominal diameter.

For comparison the discard criteria of the current standards
The following table indicates whether a rope is to be replaced, based on the number of broken wires in the rope section with the highest number of such fractions. The reference length is 6 x or 30 x the rope diameter. The table complies with the specification of TRA 102 and DIN 15020, Bl. 2.

The values apply only under the following conditions:

- the ropes are single layer regular lay ropes (the steel core is not considered a strand layer)
- the friction sheave is of cast iron or steel (for traction drive elevators)
- the broken wires are distributed evenly across the majority of the strands

Rope construction	Number of wires in outer strands	Number of broken wires within a length of 6 x Ø	Number of broken wires within a length of 30 x Ø
DRAKO 6 x 19 S – FC	= 114 wires	6	12
DRAKO 6 x 19 W – FC DRAKO 6 x 25 F – FC DRAKO 180 B (in 6 x 25 F – FC)	= 114 wires	10	19
DRAKO 8 x 19 S – FC DRAKO 250 H, 8 mm	= 152 wires	10	19
DRAKO 8 x 19 W – FC DRAKO 8 x 25 F – FC DRAKO 250 T DRAKO 250 H (except 8 mm) DRAKO 200 B	= 152 wires	13	26
DRAKO 300 T DRAKO 310 T	= 180 – 200 wires	16	32
DRAKO 180 B (in 6 x 36 WS – FC)	= 216 wires	18	35

Please note

- If wire fractures don't occur in a regular pattern across the majority of the strands but are concentrated in one or two strands, the above table is not applicable.
- Such ropes must be replaced, if there are 5 or more broken wires adjacent to each other within one strand.
- Ropes with excessive crown wear tend to show rapidly increasing numbers of broken wires.

Under certain circumstances and depending on the operating conditions, the machine design and the loads, etc., ropes might have to be replaced, even if there are no visible broken wires at the outer strands: ropes with a diameter reduction of more than 6% (from nominal diameter) even in only a short section must be immediately removed.

If the elevator system contains plastic sheaves, refer to German safety instructions for elevators "SR Kunststoffrollen", as ropes in such systems tend to show internal rather then external wire fractures. The above table is to be seen only as a guideline for rope inspection and the decision for rope discard. Please note that the above figures are never to be considered the only criteria for rope discard. Any detected changes in the rope must be taken into account when assessing a rope. The final decision to remove a rope must be made on the basis of the experience of the assessing person.

For DRAKO ropes installed in systems outside Germany, the relevant statutory regulations for rope replacement apply, please look also to pr EN 12385-3 Annex C.

Ferrule secured Thimble with Eye Bolt

How to order: (additional to the designation of the required rope) f. i.:
a 13 mm rope, thimble DIN 6899 (if DIN 3090, please specify) selected eye bolt M 20, 450 mm long and spring:

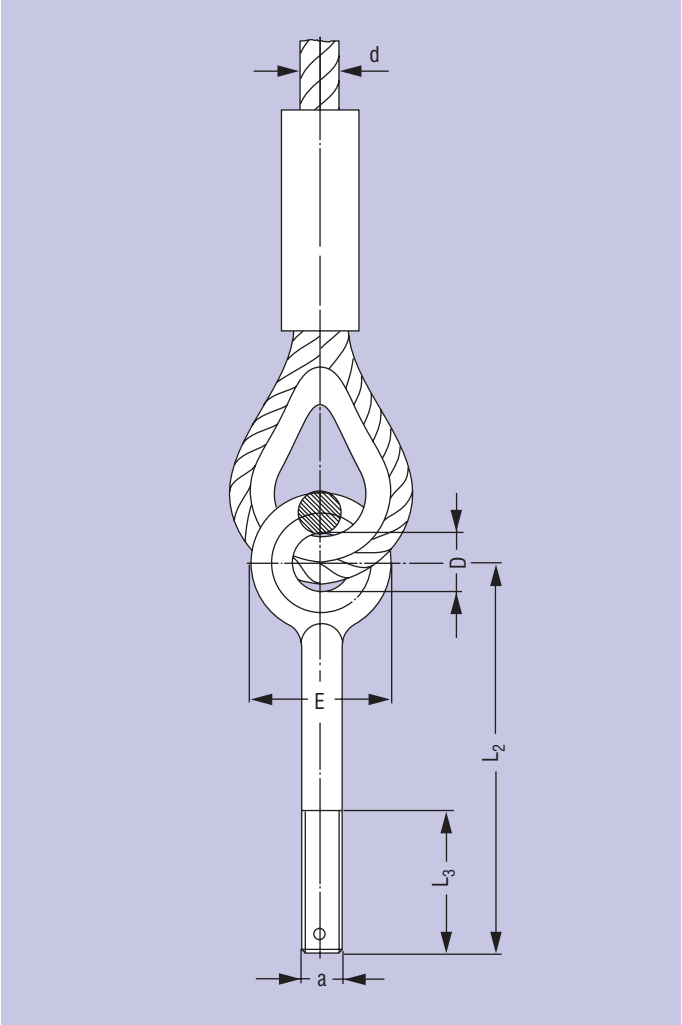
One rope end with thimble and eye bolt M 20 x 450 D

Please note:

The elevator rope constructions shown in this catalogue have very different minimum breaking forces. When specifying rope terminations and springs or spring buffers, their respective maximum applyable force is to be considered.

Rope terminations are to be secured against rotation.

Anti-Twist Rope Sets (4 mm rope with 2 wire rope grips) are available ex stock.



Eye Bolts

Rope-Ø d mm	Nominal Size (a x L_2)	L_3 (approx.) mm	D mm	E (approx.) mm	F_{min} kN
6-8	M 12 x 260	60	26	50	33,7
	M 12 x 350	150	26	50	33,7
	M 12 x 500	150	26	50	33,7
9-11	M 16 x 260	120	22	51,4	62,8
	M 16 x 300	150	22	51,4	62,8
	M 16 x 350	200	22	51,4	62,8
	M 16 x 450	200	22	51,4	62,8
	M 16 x 500	200	22	51,4	62,8
	M 16 x 600	200	22	51,4	62,8
	M 16 x 800	400	22	51,4	62,8
12-14	M 20 x 290	120	27,7	67,6	98
	M 20 x 450	200	27,7	67,6	98
	M 20 x 600	200	27,7	67,6	98
	M 20 x 800	400	27,7	67,6	98
15-17	M 24 x 400	220	27	65	141

Eye bolts will come with washer (DIN 125), 2 nuts and 1 split-pin.

On request we supply for this kind of rope suspension a complete accessory kit (unmounted), comprising

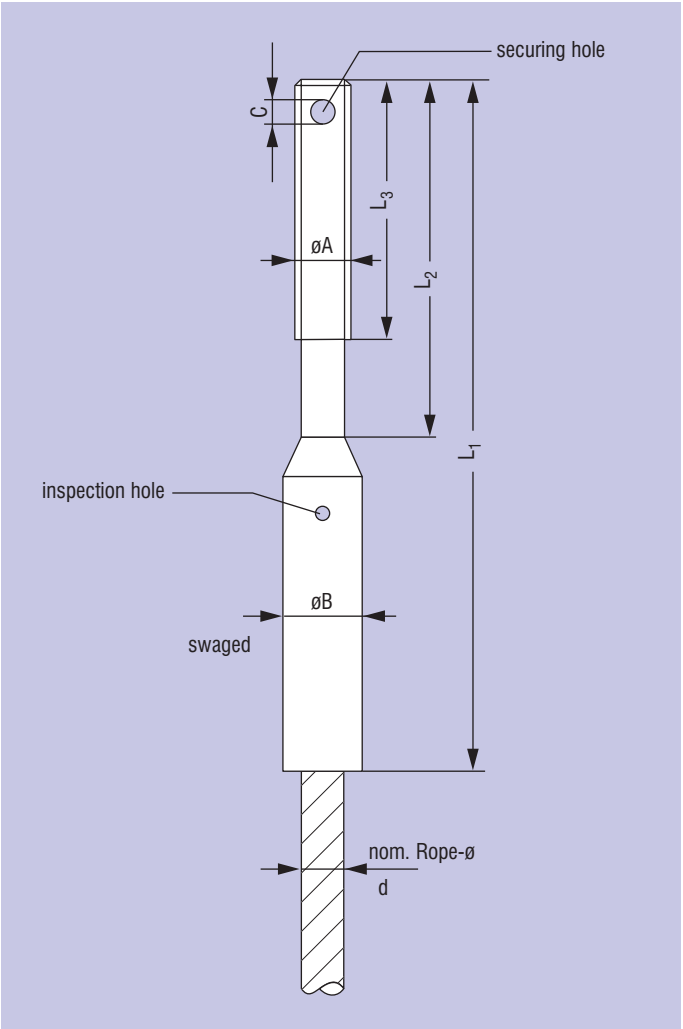
Designations	Contents
D	1 pressure spring, 2 spring collars, 2 nuts, 1 split pin
FP	1 elastomer spring, 1 washer, 2 nuts, 1 split pin
FP 2	2 elastomer springs, 1 washer, 2 nuts, 1 split pin
FP 3	3 elastomer springs, 1 washer, 2 nuts, 1 split pin

Swaged Fitting with Thread

This slim construction of rope termination is particularly suitable for modern concepts of machineroomless elevators.

These terminations must be secured against rotation by means of the big securing hole at the upper end of the rod and a small steel wire rope. The small inspection hole in the swaged part of the terminal allows to control the presence of sufficient inserted rope length.

According to EN 81 it is necessary for such a non standardized termination system, to demonstrate to an authorized body that it is a system of equivalent safety like the usual standardized ones. “TÜV Süddeutschland” have certified, on the base of researches at the “Institut für Fördertechnik” at the University of Stuttgart, that our system of swaged fittings fulfils the requirements of EN 81-2000 for DRAKO-Ropes with fibre cores as well as for DRAKO-Ropes with steel core (fullsteel ropes), exception DRAKO 300 TX.



Please note

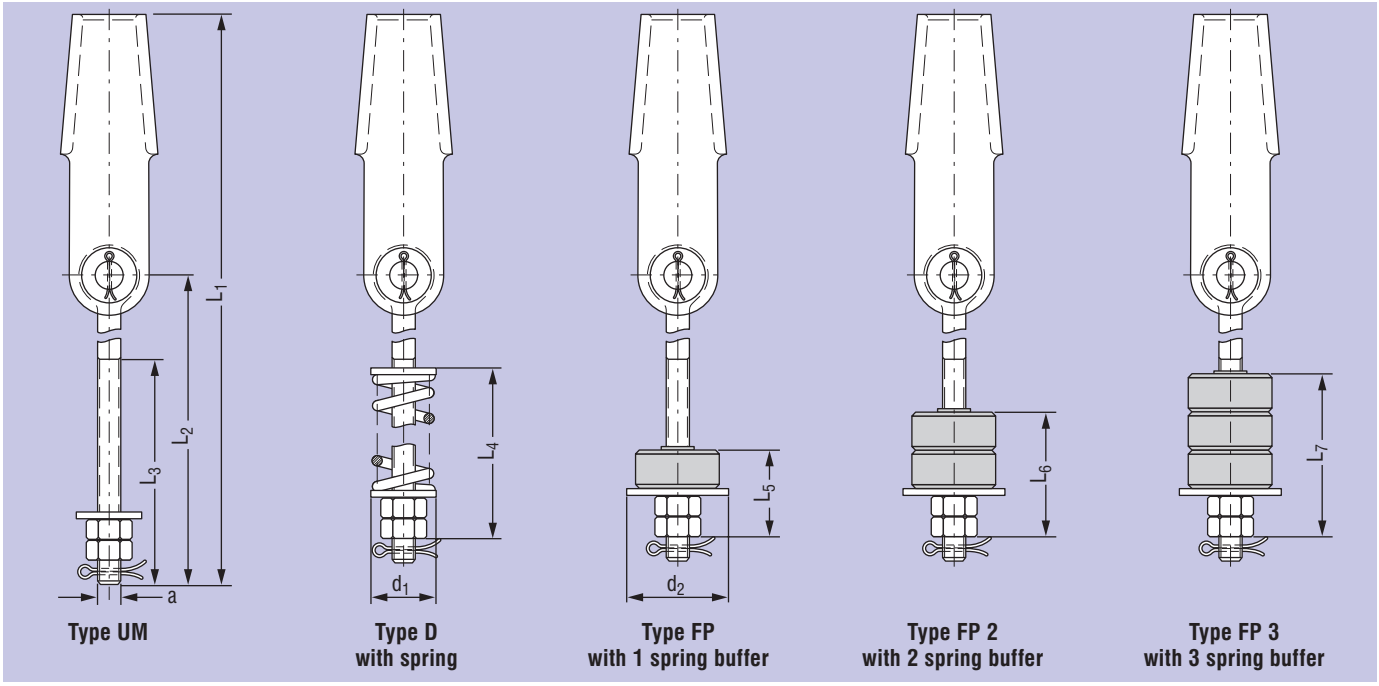
The elevator rope constructions, shown in this catalogue have very different minimum breaking forces. When specifying springs or spring buffers, their respective maximum applyable force is to be considered.

Nom. rope diameter d mm	thread diameter A	thread length L_3 approx. mm	shaft length L_2 approx. mm	swaged diameter B max. mm	total length L_1 approx. mm	securing hole diameter C mm
4	M 8 x 1,25	140	140	10,5	185	3
5	M 10 x 1,5	140	140	14,2	194	3
6	M 12 x 1,75	180	180	14,2	243	6
6	M 10	60	236	14,2	308	3
6,5	M 10	60	236	14,2	310	3
8*	M 14	160	163	16,18	240	6
8**	M 14	200	300	16,18	380	6
10*	M 16	160	163	17,87	260	8
10**	M 16	200	300	17,87	400	8
11*	M 16	160	163	20,55	270	8
11**	M 16	200	300	20,55	410	8
12*	M 16	160	163	22,38	280	8
12**	M 16	200	300	22,38	420	8
13*	M 20	160	163	24,30	280	8
13**	M 20	200	300	24,30	420	8
16*	M 24	160	163	29,30	310	8
16*	M 24	200	250	29,30	400	8
16**	M 24	250	350	29,30	500	8

* special size: when used with springs, then only with Elastomer spring buffers
** normal size

Symmetric Wedge Socket EN 13411-7 (DIN 15 315) with Eye Bolt DIN 444

Termination acc. to EN 13411-7 (DIN 15 315) in combination with our eye bolts fulfil the requirement of EN 81-1, clause 9.2.3, to withstand at least 80 % of the minimum breaking force even when used together with the full-steel ropes DRAKO 250 H and 300 H.



Type UM | **Type D with spring** | **Type FP with 1 spring buffer** | **Type FP 2 with 2 spring buffer** | **Type FP 3 with 3 spring buffer**

Rope-Ø d	Nominal Size	Normal size Type UM a	L_1** mm	L_2* mm	L_3 mm	appr. kg	Type D d_1 mm	L_4 mm	appr. kg	Type FP d_2 mm	L_5 mm	appr. kg	Type FP 2 L_6 mm	appr. kg	Type FP 3 L_7 mm	appr. kg
4 - 5	5	M10	276	180	70	0,420	25	85,5	0,510							
5 - 6,5	6,5	M10	264	180	70	0,380	25	85,5	0,470							
6 - 8	8	M12	450	320	150	0,780	45	167	1,420	50	51	0,870	79	0,900	107	0,930
9 - 11	11	M16	484	320	150	1,650	45	173	2,490	58	59	1,785	87	1,815	115	1,850
12 - 14	14	M20	598	400	150	3,230	54	202	4,500	68	65	3,530	93	3,570	121	3,610
15 - 17	17	M24	674	450	150	5,300	65	248	8,150	80	74	5,830	102	5,910	130	5,990
18 - 20	20	M27	760	500	150	8,000	65	254	10,950							
21 - 25	25***	M30	740	500	150	11,000	80	251	14,500							

* normal size
** total length of the normal size combination
*** not acc. to DIN
The socket body is galvanized.

Please note

The elevator rope constructions shown in this catalogue have very different minimum breaking forces. When specifying rope terminations and springs or spring buffers, their respective maximum applyable force is to be considered.

Rope terminations are to be secured against rotation.

How to order (example) Type 14 D x length L

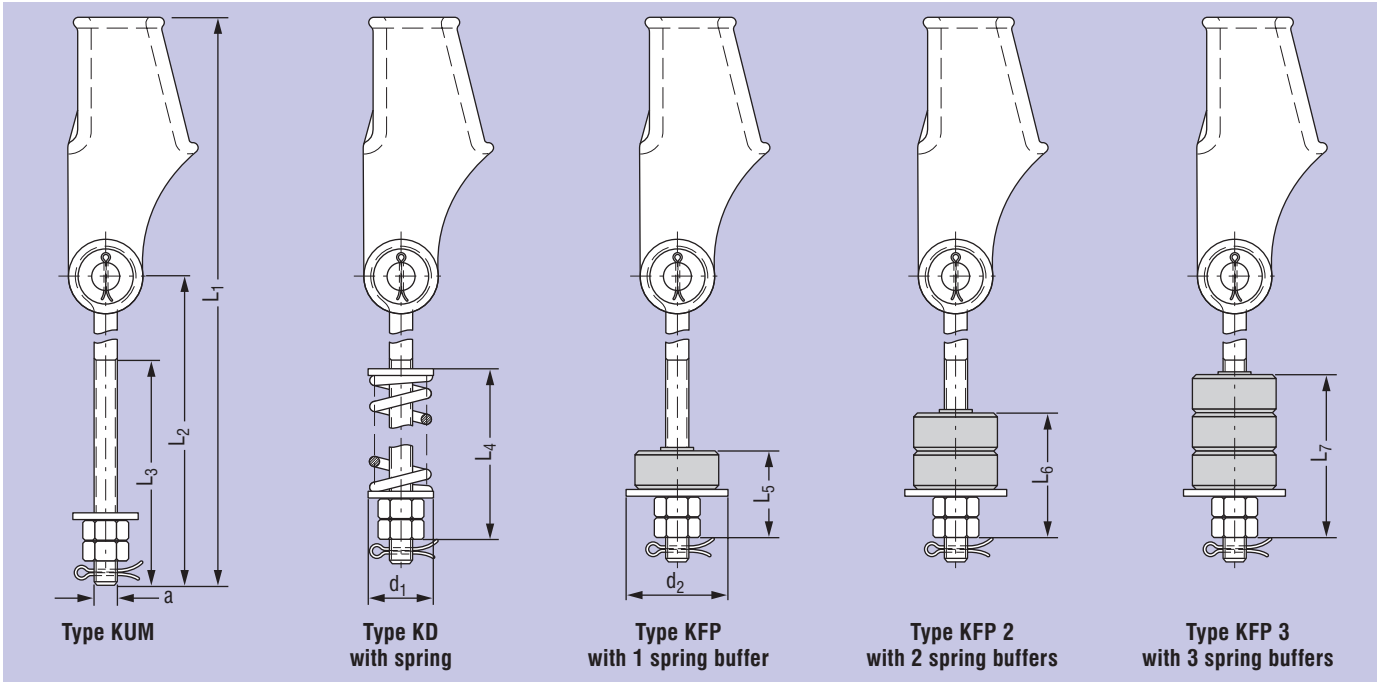
Symm. wedge socket nominal size 14 for rope – ø 12 to 14 mm

with spring

length L_2 of eye bolt acc. table above or acc. to the respective table page 30

Asymmetric Wedge Socket DIN 43 148 (EN 13411-6) with Eye Bolt similar to DIN 444

Terminations acc. to DIN 43148 only in some combinations of rope constructions, rope diameters and eye bolts are according to the requirement of EN 81-1, clause 9.2.3. (Requirement: withstanding at least 80 % of the rope's minimum breaking force). Please contact us in case of any questions.



Type KUM | **Type KD with spring** | **Type KFP with 1 spring buffer** | **Type KFP 2 with 2 spring buffers** | **Type KFP 3 with 3 spring buffers**

Rope-Ø d	Nominal Size	Normal size Type KUM a	L_1** mm	L_2* mm	L_3 mm	appr. kg	Type KD d_1 mm	L_4 mm	appr. kg	Type KFP d_2 mm	L_5 mm	appr. kg	Type KFP 2 L_6 mm	appr. kg	Type KFP 3 L_7 mm	appr. kg
6 - 7	353	M12[1)]	430	300	150	0,948	44	167	1,595	50	51	1,051	79	1,079	107	1,107
8	352	M12[1)]	430	300	150	0,920	44	167	1,567	50	51	1,023	79	1,051	107	1,079
9 - 12	351	M12[1)]	430	300	150	0,892	44	167	1,539	50	51	0,995	79	1,023	107	1,051
10 - 12	402	M16	440	300	150	1,278	44	173	2,070	57	59	1,454	87	1,482	115	1,510
12 - 14	401	M16	440	300	150	1,250	44	173	2,042	57	59	1,426	87	1,454	115	1,482
12 - 15	450	M20[1)]	590	400	150	3,330	50	202	4,840	68	65	3,620	93	3,666	121	3,712
16 - 20	500	M27[1)]	715	500	150	7,740	65	254	10,760							

* normal size. Eye bolts with other dimensions L_2 on request.
** total length for the normal size combination
[1)] Eye of bolt not acc. to DIN 444.
The socket body is galvanized.

Please note

The elevator rope constructions shown in this catalogue have very different minimum breaking forces. When specifying rope terminations and springs or spring buffers, their respective maximum applyable force is to be considered.

Rope terminations are to be secured against rotation.

How to order (example)

Type 402 KD x length L

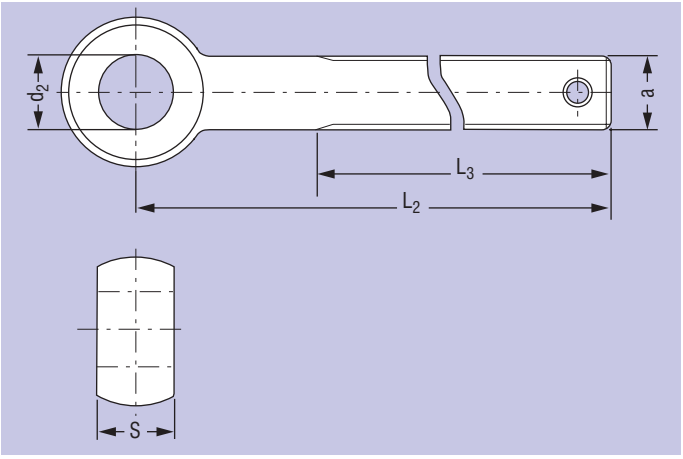
- Symm. wedge socket nominal size 402 for rope – ø 10 to 12 mm
- with spring
- length L_2 of eye bolt acc. table above

Eye Bolts

DIN 444
(in combination with symm. wedge sockets DIN 15 315)

thread "a"	M 10	M12	M 16	M 20	M 24	M 27	M 30**
F_{min} in kN	29,0	42,2	78,5	122,0	176,0	230,0	230,0
d_2	10,5	12,2	16	18	22	25	42
s	9	14	17	22	25	27	30
L_2 / L_3	**180/70**	200/100	200/100	200/100			
	130/35	250/150	250/150	250/150			
	230/70	300/150	**300/150**	**300/150**			
		320*/150	**320*/150**	320/150			
		350/150	**350/150**	350/150			
		400/150	**400/150**	**400*/150**			
		450/150	**450/150**	**450/150**	**450*/150**		
		500/150	**500/150**	**500/150**		500*/150	500*/150
		600/200	560/150	560/150			
			800/200	800/400	800/400	800/400	

All dimensions in mm

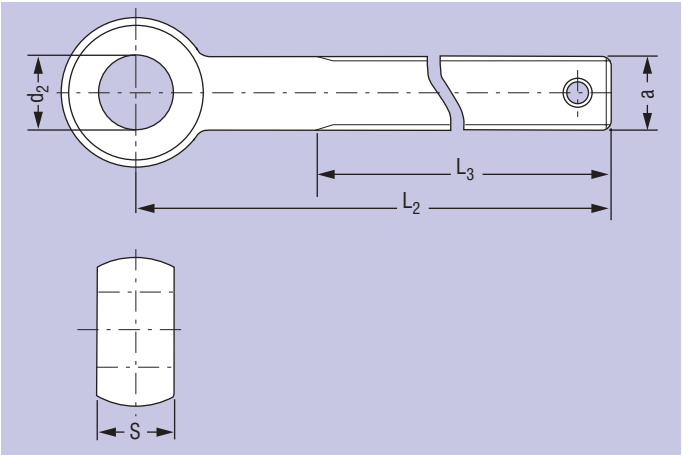


* normal sizes
Sizes in bold type are usually available ex stock.
** not acc. to DIN

similar DIN 444
(in combination with asymm. wedge sockets DIN 43 148)

thread "a"	M 12	M16[1)]	M 20	M 27
F_{min} in kN	42,2	78,5	122,0	230,0
d_2	13,5	16	19,5	25,5
s	14	17	20	22
L_2 / L_3	200[2)]/100	200/100		
	250/150	250 /150		
	300*/150	**300*/150**		
	320*/150	**320 /150**		
	350/150	**350 /150**		
	400/150	**400 /150**	400*/150	
	450/150	**450 /150**	450 /150	
	500/150	**500 /150**		500*/150
	600/200	560 /150	600 /200	
		800 /200		

All dimensions in millimeter



[1)] acc. to DIN 444
[2)] galvanized
* normal sizes
Sizes in bold type are usually available ex stock.

Wire Rope Grips EN 13411-5
(to be used with wedge sockets DIN 15315 / EN 13411-7 and DIN 43148 / EN 13411-6)

nominal size = biggest nominal rope-Ø	5	6,5	8	10	12	13*	14	16	19	22

For intermediate nominal rope diameters, the next bigger grip size shall be applied. Nominal size 5 is only applicable for 5 mm nominal rope diameter.
Usage only acc. to the requirements for application and installation of EN 13-411-5.

* available, but not acc. to EN 13411-5.

Springs for Rope Terminations

	Spring I	Spring II	Spring III	Spring IV	Spring V	Spring VI
symm. wedge socket EN 13411-7/DIN 15 315	5 D 6,5 D	8 D	11 D	14 D	17D 20 D	25 D
asymm. wedge socket EN 13411-6/DIN 43 148		351 352	401 402	450	500	–
swaged fitting	M 8 M 10	M 12 x 1,75	M 16	M 20	M 24	–
wire-Ø [mm]	4,5	7,5	9,0	11,0	15,0	18,0
outer-Ø [mm]	23,5	43,0	46,0	53,0	65,0	80,0
average spring Ø [mm]	19,0	35,5	37,0	42,0	50,0	62,0
length unloaded [mm]	61,5	135,0	135,0	157,5	190,0	155,0
maximum spring load F_{max} [kN]	1,703	3,382	5,930	9,383	14,880	24,525
compressions s [mm] at spring load F_{max}	21,0	47,0	40,5	42,0	32,5	27,0
spring factor c [kN/mm]	0,081	0,072	0,146	0,223	0,458	0,908

Calculation of compression s:

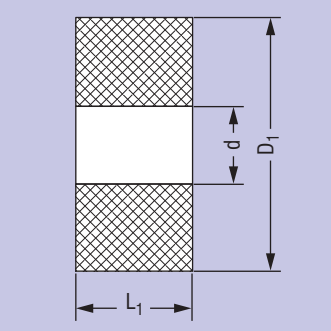
$$s = \frac{F}{c} \text{ [mm]}$$

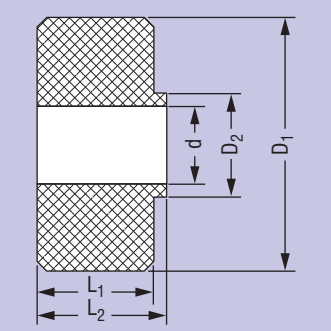
c = spring factor [kN/mm]
F = spring load [kN]
(same as rope load)

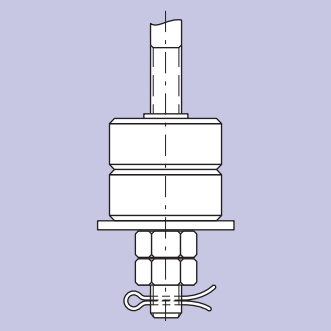
Elastomer Spring Buffers for Rope Terminations

Characteristics

- grease and oil resistant
- excellent damping properties
- material: cellular polyurethane-elastomer

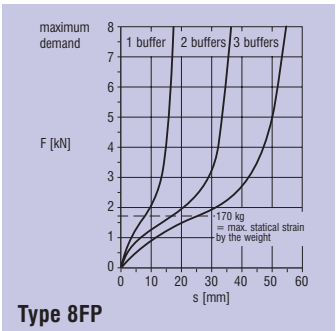




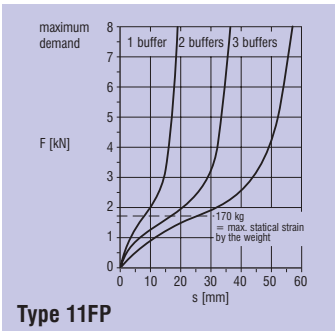


Type	d mm	D_1* mm	D_2* mm	L_1* mm	L_2* mm
8	13	50	22	28	33
11	17	50	22	28	33
14	21	65	27	28	33
17	25	80	27	28	33

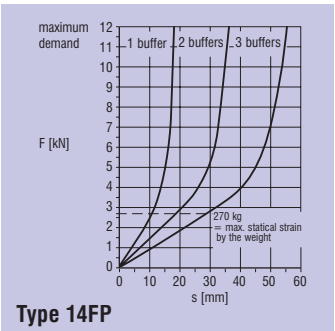
* unloaded
Dimension d must fit to the thread diameter a of the eye bolt.



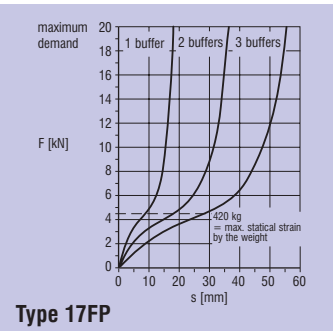
Type 8FP



Type 11FP



Type 14FP



Type 17FP

Service

General Services

Technical Assistance

We are prepared to assist you in finding the best solution for ropes, accessories and ways of dispatch.

Simplified Order Form / Online Ordering

It is our aim to make choice and ordering of ropes and rope terminations as easy as possible. Details are shown in the Fax-order form printed on the next page. Please take copies for use. You can order as well under **www.drako.de**

Stock Keeping

Continuously we keep on stock more than 80 different rope constructions and diameters for elevators. Our ready made stock includes approx. 1600 km of rope. From this stock we are in the position to deliver requested ropes in most cases.

Systemized Deliveries

You need our ropes with additional accessories at site?

➜ We offer customized solutions for ready systemized deliveries.

24. Hours Reply

If we are not in the position to answer your letter or fax the same day we will inform you the next day at the latest

- who is our person in charge,
- when you will receive the requested answer.

Seminars for your Installation and Service Staff

Ropes have to be handled competently. Even small mistakes can result in high costs.

We offer seminars for your staff; on request also at your office.

For further information please ask for our up-to-date seminar schedule.

Homepage

All technical data about ropes and accessories you will find as well online at our homepage **www.drako.de**.

"We want to satisfy you. Not only by our products, but also by our service."

Delivery Programme

Elevator Industry

- special ropes of 6-strand and 8-strand construction
- special ropes with 9 and 10 outer strands for high rise/high speed installations
- special compensating ropes
- compensating chains and their suspension means
- Ropes for small goods elevators, overspeed controllers and door mechanisms
- ropes for gondola systems with inner electric conductors

Mechanical and Construction Industry

- special crane and excavator ropes with 8 and 9 outer strands
- rotation-resistant and non-rotating ropes for electric hoists
- non-rotating ropes for tower cranes and mobile cranes
- winch ropes, clamshell ropes and pendant ropes
- slings according to DIN 3088 and ISO 8792

Mining

- Koepe hoist ropes
- drum hoist ropes
- flat hoist ropes
- flat balance ropes
- round balance ropes (multi-layer flat strand ropes)
- haulage ropes for monorail conveyors
- signal ropes

Shaft Sinking

- rotation resistant and non-rotating stage ropes
- flat hoist ropes
- clamshell ropes
- guide ropes
- direction survey ropes

Oilfield Industry

- rotary drilling lines according to API Spec. 9A
- swab and bailing lines
- winch lines
- percussion drilling lines
- air winch lines
- logging lines and wires

Cable ways

Stranded ropes for

- aerial tramways
- gondolas
- chair lifts
- T-bar lifts
- grooming vehicles
  according to German, Austrian, Swiss and European regulations and standards
- Installation on request

Additional

- rope terminations
- wire rope socks for cables and ropes
- wire rope with polymer cover
- spiral ropes and strands (automotive industry)
- deep sea research ropes.
- Tiefseewindenseil

Approvals and certifications:

- Approved by Germ. Lloyd, Lloyd's Register of Shipping
- Quality Managementsystem acc. EN ISO 9001
- LOM (Spain)
- GOST (Russia)

Ways of Dispatch

Up to a length of 50 m, elevator rope will be commissioned in **coils**, if requested, also with ferrule secured terminations.

The dispatch of each commission will be effected on **pallets**, accessories loose in a bag.

Larger quantities will be packed in **skeleton containers** if requested.

Cut-to-lengths, usually commissions of more than 50 meters single length, will be dispatched on **non-returnable** reels on pallets, also with ferrule secured terminations, if requested.

Production lengths will be commissioned on **wooden reels** which can be returned.

These reels can also be packed (flat) on **EURO-pallets.**

Furthermore we offer the opportunity to let you have your commissions systemized. In this case, elevator ropes and loose rope termination material as well as other accessories and governor ropes, for example, can be packed in **stable cardboard boxes with handles.** Then the boxes will be dispatched stacked and ringed on **EURO-pallets.** This pakking is a solution for a weight up to approx. 80 kg gross per box.

For heavy commissions we provide a **systemized delivery on pallets.**

Based on a delivery of one packing unit per commission, each rope component package can easily be identified to the corresponding elevator. Sorting risks as well as loss of parts (for example accessories, during forwarding, in your warehouse, or on site) can be minimized by this **logistic service.** As an option bar code labels or labels according to your request can be added.

We are ready to assist in finding your best dispatch solution.

Warnings

Ropes must only be used in accordance with the **applicable safety regulations** and the relevant standards (DIN 15020, EN 12 385 and EN 81 and the German TRA). If the installation is outside Germany the relevant statutory regulations and the national standards apply. Before usage inspect the rope and the rope terminations and comply with the recommendations of the manufacturer and the applicable standards.

Note:

The breaking forces in the catalogue apply exclusively to new ropes. Whether the rope is performing as expected in the long run depends on

- the design of your elevator system,
- the selected rope diameter,
- the chosen rope construction,
- the chosen rope grade and the
- correct installation and maintenance of the elevator in which the rope is used, and
- the correct storage, handling, maintenance and inspection of the rope.

General instructions:

The standards referred to in this catalogue are the standards as amended and valid.

This catalogue replaces all previous catalogues. Any technical data printed in previous catalogues cease to be valid.

☐ **Inquiry:** **Fax +49 (0)208-429 01-21**
☐ **Order:** **Fax +49 (0)208-429 01-43**

to

PFEIFER DRAKO
DRAHTSEILWERK GMBH & CO. KG

RHEINSTRASSE 19-23
D-45478 MUELHEIM AN DER RUHR
TELEFON +49 (0)208-429 01-0

Customer-No.
Company
Ordererd by
Phone
Date

Order/Inquiry-No.:
Required delivery time:

Item 1	☐ **Traction drive ropes** ☐ **Hydraulic ropes**				Price Euro
	pieces	length in m	Ø mm	construction	
Item 2	**1. rope end**				
	☐ plain end ☐ one end with ferrule secured thimble ☐ and attached eye bolt M _____ with spring and accessories with 1 PU-buffer and accessories with 2 PU-buffer and accessories with 3 PU-buffer and accessories without any ☐ rope termination type _____ (loose) ☐ eye bolt M _____ (quantity according to the number of the ropes)				
Item 3	**2. rope end**				
	☐ plain end ☐ rope termination type UM _____ (loose) (quantity according to the number of the ropes)				
Item 4	_____ pieces of **rope grips** EN 13411-5 size _____				
Item 5	_____ pieces of **Anti-Twist Rope Sets**				
Item 6	**Governor rope**				
	pieces	length in m	Ø mm	construction	
Item 7	_____ pieces **wedge sockets** DIN 15315 size _____				
Item 8	_____ pieces of **rope grips** EN 13411-5 size _____				
Item 9	For ordering compensating ropes please use the order form from the special catalogue "Compensation".				
Delivery address (if different from order address):				Signature	

Notes:

PFEIFER
DRAKO

PFEIFER DRAKO
DRAHTSEILWERK GMBH & CO. KG

Rheinstraße 19 – 23
D-45478 MÜLHEIM AN DER RUHR
Tel. +49-208-42901-0
Fax +49-208-42901-21
E-Mail info@drako.de
Internet www.drako.de

PFEIFER-Headquarters

PFEIFER
SEIL- UND HEBETECHNIK GMBH

Dr.-Karl-Lenz-Str. 66
D-87700 MEMMINGEN
Tel. +49-8331-937-0
Fax +49-8331-937-294
E-Mail info@pfeifer.de
Internet www.pfeifer.info

Distributors in Europe

in Belgium/Netherlands
Handels- en Ingenieursbureau
Bakker & Co. B.V.
Postbus 1235
NL-3330 CE ZWIJNDRECHT
Tel. +31-78-6101666
Fax +31-78-6100462
E-Mail staal@bakker-co.com

in Austria
PFEIFER SEIL- UND
HEBETECHNIK GMBH
Harterfeldweg 2
A-4481 ASTEN
Tel. +43-7224-66224-0
Fax +43-7224-66224-13
E-Mail psh-austria@pfeifer.de

in Hungary
Liftimpex Kft.
Liget u. 1
HN-5000 SZOLNOK
Tel. +36-56-372524
Fax +36-56-410586
E-Mail lift21@axelero.hu

in the United Kingdom/Ireland
PFEIFER DRAKO LTD.
Marshfield Bank, Wollstanwood
GB-CREWE CW2 8UY
Tel. +44-1270-587728
Fax +44-1270-587913
E-Mail sales@pfeiferdrako.co.uk

in Luxembourg
PFEIFER SOGEQUIP S.à r.l.
Zone Industrielle Schifflange-Foetz
L-3844 SCHIFFLANGE
Tel. +352-574242
Fax +352-574262
E-Mail sogequip@pt.lu

in Spain
PFEIFER CABLES Y EQUIPOS
DE ELEVACIÓN, S.L.
Avda. de los Pirineros, 25 - Nave 20
San Sebastian de los Reyes
ES-28700 MADRID
Tel. +34-91-659-3185
Fax +34-91-659-3139
E-Mail p-es@pfeifer.de

in Poland
PFEIFER TECHNIKA LINOWA I
DZWIGOWA Sp. z o.o.
ul. Wroclawska 68
PL-55330 Krepice Krepice/Wroclaw
Tel. +48-71-3980760
Fax +48-71-3980769
E-Mail info@pfeifer.pl

in Russia
OOO PFEIFER KANATI & PODJÖMNIE
TEHNOLOGII
3rd proezd Perova Polya, 8
RU-111141 MOSCOW
Tel. +7-495-5057494
Fax +7-495-3630073
E-Mail kanaty@pfeifer-rossia.ru

Distributors worldwide

in USA/Canada
AFD Industries, Inc.
555 Market Avenue North
NORTH CANTON, OH 44720
Tel. +1-330-4523300
Fax +1-330-4522331
E-Mail info@afdindustries.com

in UAE/Dubai
PFEIFER WIRE ROPE & LIFTING
TECHNOLOGY LLC
P.O. Box 120190
Dubai, UAE
Tel. +971-43419995
Fax +971-43419997

in Far East
ROPES TECHNOLOGY CORP.
FAR EAST PTE LTD.
27, Tuas Ave 8, Jurong
SINGAPORE 639242
Tel. +65-6-861-6066
Fax +65-6-861-3088
E-Mail ropetech@pacific.net.sg

in Iran
Tamkin Foulad Co.
No. 11. 21 st. Ave. Argentine Square
TEHERAN 15139-14114, Iran
Tel. +98-21-8871-3452-3
Fax +98-21-8872-7029
E-Mail info@tamkinfoulad.com

in Australia
Bullivants Lifting & Safety
Specialists
10–14 Kellogg Road
GLENDENNING, NSW 2761
Tel. +61-2-97713000
Fax +61-2-96253355
E-Mail sales@bullivants.com

in Hongkong/China
Cobelco Industrial Supplies Ltd.
Room 01, 26/F, Tung Wai Commercial
Building
109-111 Gloucester Road,
WAN CHAI, HONG KONG
Tel. +852-2889-0080
Fax +852-2898-7077
E-Mail sales@cobelco.com.hk

in Middle East
KCPC The Kuwait Company for Process
Plant Construction & Contracting K.S.C.
P.O. Box 3404
13035 SAFAT/KUWAIT
Tel. +965-2-466-650
Fax +965-2-451-411
E-Mail kcpc@afdindustries.com

in China
PFEIFER STEEL WIRE ROPE
(Shanghai) Co., Ltd.
Hall 64-2, # 709, Ling Shi Lu,
Zha Bei District
SHANGHAI, P.R.C.
Tel. +86-21-56778006
Fax +86-21-56779229
E-Mail info@pfeifer.com.cn

11.07.pdf KS