ELEVATOR PRODUCTS

PFEIFER
DRAKO

12/2017

Elevator Products

- for standard and special installations
- for mid- and high-rise
- for low D/d-ratios
- for compensation

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Elevator Ropes

PFEIFER DRAKO

PFEIFER DRAKO, an associate company of the PFEIFER Group, has produced and developed special wire ropes for the elevator construction industry for more than 200 years. Thanks to the extensive sales & distribution network and numerous associate companies in all corners of the globe, DRAKO's special ropes are safely and reliably in use wherever people need to travel vertically. From Moscow to Kuala Lumpur, from New York to Hong Kong and also in Paris, London and Frankfurt, we build on close and long-term relations with our discerning customers. In turn, elevator manufacturers the world over have come to trust us as reliable partners.

At DRAKO, tradition and innovation share equal ranking: One aspect would not be possible without the other. To continue widening our knowledge about ropes and to ensure that our technology remains truly state of the art, we collaborate with universities and institutes. The streamlined precision manufacture of the serial products and the management of customized projects are governed by DIN EN ISO 9001 in accordance with our own quality management system (QMS). Our company handles resources with as little impact on the environment as possible. We are certified to ISO 50001, 14001 and Ökoprofit.

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.

We work to …

- the highest safety standards
- economical levels of efficiency and
- reliable service

… for the benefit of our customers, and that is our goal.

Front cover (right): Shanghai World Financial Center, Shanghai

Photo left: Hütter-Aufzüge GmbH

PFEIFER DRAKO

Advantages of DRAKO steel wire ropes

- special wire ropes for your application
- proven strand design and high adaptability
- long service life
- DRAKO-made fibre core, constant quality
- low elastic and permanent elongation
- weight compensating chains at different degrees of weight
- weight compensating chains with various loop sizes
- machine-welded chain links
- inductive wear testing possible since there are no fillers in the coating
- smart accessories for easier installation
- low maintenance costs
- 100 % rope quality, high quality assurance
- fair cost-benefit ratio
- highly qualified and experienced personnel
- competent advice
- reliable service
- worldwide sales network

Our Production & Logistics site at Rheinstrasse, Mülheim an der Ruhr, Germany

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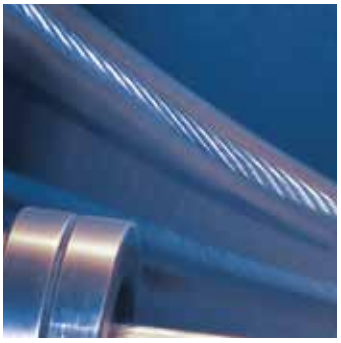
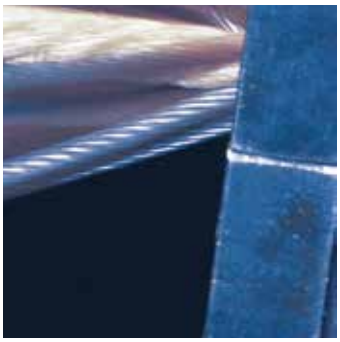
About Wire Ropes

Definitions, Designation and Classification

The European Rope Standards EN 12385-1 (General Requirements), EN 12385-2 (with the above title) and EN 12385-5 (Stranded Ropes for Lifts) include rope designation with symbols laid down in EN 12385-2. These symbols – derived from English words – are the same for all European deliveries (see below):





Symbols for rope cores

FC = fibre core
NFC = natural fibre core
SFC = synthetic fibre core
IWRC = independent 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

Our special ropes can be ordered with their brand name, f.i. DRAKO 300T.

Rope class

So far each rope construction is governed by rope standards. In the recent 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 addresses the nominal tensile strength grades of the outer and inner wires of the rope. Additionally, the rope grade defines the minimum breaking strength 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.

General reference: The rope standards mentioned in this catalogue are those valid at the time of printing.

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
- natural fibre core
- rope grade
  here: dual tensile
  outer wires: 1370 N/mm²
  inner wires: 1770 N/mm²
- wire finish: bright
- lay: ordinary lay right hand

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

Pictograms / Explanation

For easy use and description of rope properties pictograms with the following meanings are used:

- Characteristics
- N/mm² — Rope grades
- Elastic elongation – at 10% of the minimum breaking strength F_{min}
- Permanent elongation – acc. to DIN 51201
- Rope diameter tolerance

Elevator Rope Construction

Elevator Ropes

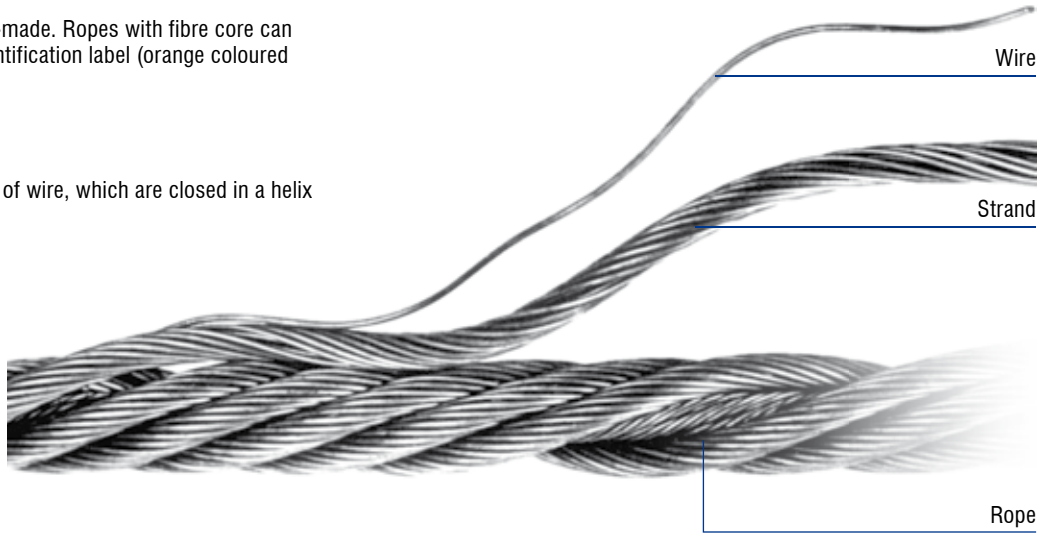
All DRAKO elevator ropes are DRAKO-made. Ropes with fibre core can easily be identified by the DRAKO-identification label (orange coloured synthetic filament in the fibre core).

Strands

Strands consist of one or more layers of wire, which are closed in a helix around the centre 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 are qualified as suppliers of stable quality for 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 low hardness, 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 to uniformity and stable lubricant content.

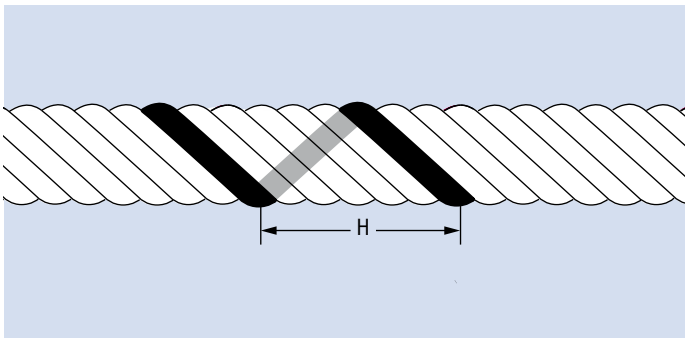
Synthetic fibre cores offer the advantage of an exactness in diameter and form-stability and are also rot resistant in humid environs.

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

Photo: Janzhoff-Aufzüge GmbH

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).



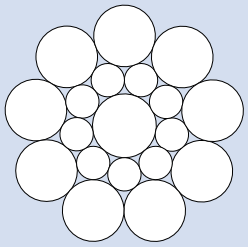
Lay Length

The lay length, f. i. mentioned on page 11, is described as follows: Lay length is the distance (H) parallel to the longitudinal rope axis in which an outer strand makes a complete turn (or helix) about the axis of the rope.

Strand Constructions

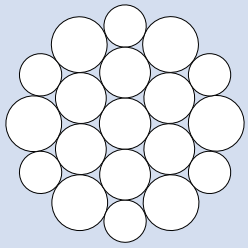
Here are information why certain strand and rope constructions are better qualified for specific applications in elevators.

For more detailed information about ropes and rope handling please see our technical brochure ‘Steel Wire Ropes in Elevators’.
Please ask for it or look at **www.drako.de/en**.



Seale

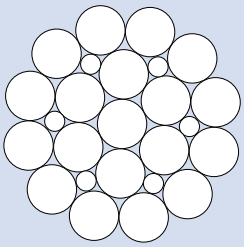
The most common strand construction for elevator ropes worldwide is Seale (1-9-9). This has at least the following reason: Elevator ropes are known to get abrasion in usage and the big outer wires of Seale have a big metallic cross-section to be abrased before the wires will break.



Warrington

Whenever a comparison of fatigue 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.

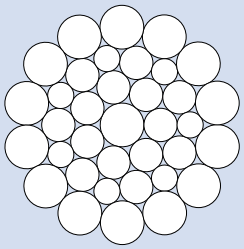
It must be taken into account that in elevators here is not only abrasion but also a lot of fatigue bending. Especially in elevators with double wrap drives or in roped hydraulic elevators the latter is more important.



Filler (Filler wire construction)

Filler wire strand construction is an especially fatigue 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.



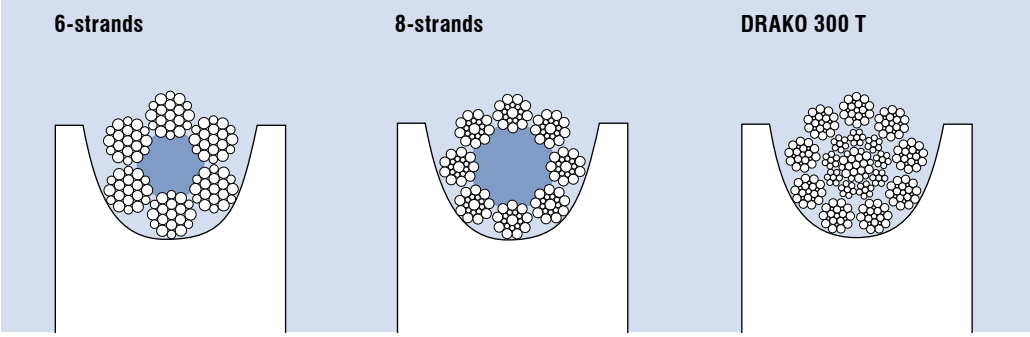
Warrington-Seale

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.

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 provides the evidence for this theory.



Quality

As we are specialized on the production of elevator ropes, we are accustomed to produce these ropes in big production lengths on special 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.

Ropes from the same Batch

We recommend to have all ropes from the same production run (batch) to achieve the best possible performance of a rope set in an elevator. Replacing single ropes of a rope set has to be avoided.

100 % 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 fit 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 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 see page 12 ff.	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 strength 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 see page 19 ff.	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	5

This shows, that the diameter tolerances of DRAKO elevator ropes are equal to or smaller than those of the 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.

Discard Criteria

Discard criteria according to the elevator rope standards EN 12385 - 5 and ISO 4344 and extended based on DIN 15020:

	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	5	5	6	More than 5	More than 5	More than 6
Intermediate wire break (Valley breaks)	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

For comparison the discard criteria of the current standards:

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	> 180 wires	16	32
DRAKO 180 B (in 6 x 36 WS – FC)	= 216 wires	18	35

The table above 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.

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

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 to EN 12385-3 Annex C also.

Ropes for Traction Sheave Elevators
with Steel Core (IWRC)

preformed, prestretched, bright (galvanized on request, in some diameters ex stock)

N/mm²

1570 and 1960 as DRAKO 300 TX

≤ 0.11 %

≤ 0.15 %

see page 10

DRAKO 300 T and 300 TX

9-strand heavy duty rope

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

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 being nationally and internationally successful in demanding building projects, ropes with steel core are now also implemented in the relevant European and ISO-standards.

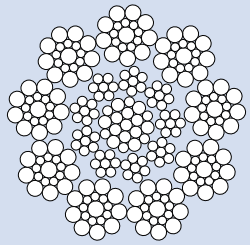
Standard wire strength will soon reach the height limit in the challenge of the highest elevator shafts. Increasing the tensile strength of the rope wires can be a feasible way to shift this limit further. For example as 300TX with nominal wire strength of 1960 N/mm² the rope offers new advantages to high and super high rise applications. The number of ropes, and thereby the rope mass, could be reduced in many hoist ways. Invest and installation costs can be reduced. Weight savings in rope mass enable a sustainable reduction of the power consumption.

Field of 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.

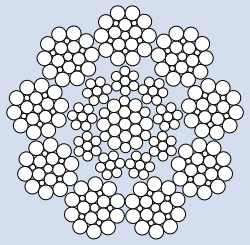
Advantages

- very round cross-section
- many thin wires, hence very flexible with good bending performance
- high flexural performance
- small elastic and plastic elongation
- Marking line for an easy installation



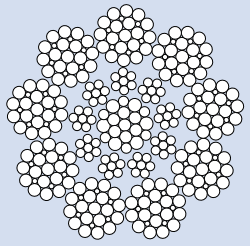
9 x 19 S – IWRC

Nom. Rope-Ø	Minimum breaking strength F_{min}		Length mass	Metallic cross-section
	1570	1960**	approx.	approx.
mm	kN	kN	kg/100 m	mm²
8.0	42.1	–	26.1	30.8
9.0	53.3	–	33.1	39.0
9.5	59.4	–	36.8	43.5



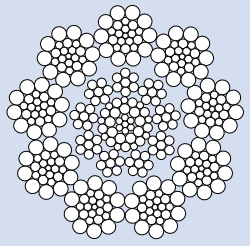
9 x 21 F – IWRC

10.0	66.0	–	42.8	49.7
11.0	79.9	–	51.8	60.1
12.0	95.1	–	61.6	71.6
13.0	111.6	136.0*	72.3	84.0



9 x 25 F – IWRC

14.0	133.0	–	84.0	96.6
15.0	153.0	–	96.0	110.9
15.5	163.0*	–	103.0	118.4
16.0	174.0	208.0*	110.0	126.2
17.5	208.0*	–	131.0	151.0
18.0	220.0*	–	139.0	159.7
19.0	245.0	298.0*	154.0	178.0
20.0	272.0*	–	171.0	197.2



9 x 26 WS – IWRC

22.0	333.0*	390.0*	215.0	243.5

* no stock material

** DRAKO 300 TX not covered by recent standards for suspension ropes

Ropes for Traction Sheave Elevators
Double-Parallel Steel Core Ropes

preformed, prestretched, bright, compacted

1570 and 1770

≤ 0.10 %

≤ 0.10 %

see page 10

DRAKO 250 TPC

8-strand compacted double-parallel steel core rope

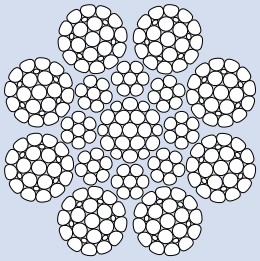
Thanks to the compaction of the strands, the metallic cross-section is additionally enlarged. This, in turn, leads to a further increase in breaking strength as compared to non-compacted double-parallel ropes. Moreover, the compacted outer strands are well-rounded and go easy on traction and deflection sheaves. The run is particularly quiet, which thus enhances ride comfort. Due to compaction, rotation is reduced during the installation process.

Field of Application

Suitable for systems with large loads and high demands not just on precision stopping for loading and unloading procedures but also in terms of ride comfort.

Advantages

- very rounded rope cross-section
- very high flexural performance
- unrivalled large metallic filling factor
- high cross-stability
- very low elastic and plastic elongation
- very high breaking strengths with rope grade 1570 already
- super quiet smooth run
- Marking line for an easy installation



8 x 25 F – PWRC

Nom. Rope-Ø	Minimum breaking strength F_{min}		Length mass	Metallic cross-section
	1570	1770	approx.	approx.
mm	kN	kN	kg/100 m	mm²
10.0*	74.0	80.1	46.0	53.0
11.0*	89.5	96.9	55.7	64.3
13.0*	130.0	138.0	80.1	91.8
16.0*	198.0	209.0	119.6	138.1
19.0*	279.0	299.0	169.7	195.4

* no stock material

preformed, prestretched, bright

1570

≤ 0.10 %

≤ 0.13 %

see page 10

DRAKO 300 TP

9-strand double-parallel steel core rope

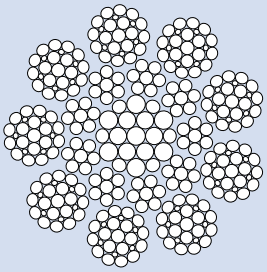
This is the strand design of the time-proven DRAKO 300 T, here with a double-parallel rope. The wide metallic cross-section leads to higher breaking strengths and reduced elastic and permanent elongation. The simplified stranding process with double-parallel ropes leads to a different rope behaviour during installation compared to our independently stranded IWRC ropes.

Field of Application

Suitable for systems with high demands on precision stopping for loading and unloading procedures.

Advantages

- well-rounded rope cross-section
- very high flexural performance
- very large metallic filling factor
- high cross-stability
- very low elastic and plastic elongation
- high breaking strengths
- Marking line for an easy installation



9 x 25 F – PWRC

Nom. Rope-Ø	Minimum breaking strength F_{min}	Length mass	Metallic cross-section
	1570	approx.	approx.
mm	kN	kg/100 m	mm²
12.0*	101.0	62.7	73.9
13.0*	119.0	74.8	86.6
16.0*	180.0	113.0	131.0
19.0*	254.0	159.0	187.0
22.0*	340.0	213.0	246.0

* no stock material

Ropes for Traction Sheave Elevators
Steel Core Ropes

TÜV Süd approved!

preformed, prestretched, bright, right hand, ordinary lay

1570 and 1770 N/mm²

≤ 0.12 %

≤ 0.15 %

see page 10

DRAKO 250 T

8-strand steel core rope

In million ways established steel core rope with 8 outer strands in Warrington design also with smaller rope diameters. By intense testing and verification of safety now approved for very low D/d ratio! Also for indirect hydraulic elevators according to EN 81.

TÜV Süd Certificate CA067 (Ø 6.0 – 8.0)

- very low D/d ratio of up to 8 mm in diameter
- required drive torque is greatly reduced
- cost saving drives possible
- space saving in indirect hydraulic elevators thanks to very small pulleys

So customized elevator systems with an optimized cost benefit ratio are possible.

Advantages

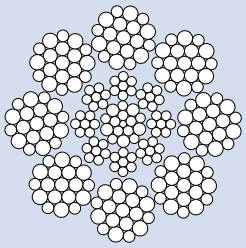
- flexible with good bending endurance
- low elastic and plastic elongation
- high breaking strength in relation to diameter
- Marking line for an easy installation

Field of Application

The customer-focussed and cost optimized solution for individually designed and more frequented elevators.

Extended application range

With the aid of our TÜV Süd certificate concerning the examination of conformity CA067 is the application of wire ropes Ø ≤ 8 mm with reduced D-/d-ratio possible.



8 x 19 W + IWRC

D/d ≥ 18.5

Nom. Rope-Ø	Minimum breaking strength F_{min}		Length mass	Metallic cross-section
mm	1570 kN	1770 kN	approx. kg/100 m	approx. mm²
6.0	–	26.8	16.4	18.5
6.5	–	31.5	17.9	20.6
8.0	43.3	46.6	27.3	31.6
9.0	54.8	–	34.3	40.0
10.0	67.7	72.7	42.3	49.4
11.0	81.9	–	51.2	59.7
12.0	97.4	–	61.0	71.1
13.0	114.0	–	71.5	83.4
14.0	133.0	–	82.9	96.7
16.0	173.0	–	108.3	126.0

preformed, prestretched, bright, right hand, ordinary lay

1570

≤ 0.15 %

≤ 0.15 %

see page 10

DRAKO 210 TFS

8-strand steel and fibre core

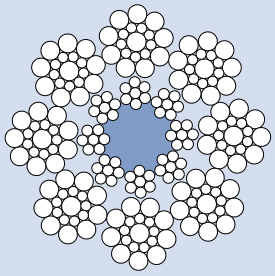
Steel rope with 8 outer strands and combined steel and fibre core. Thanks to that combined core, this special traction rope offers enhanced cross-elasticity to adapt to unique groove requirements and slightly worn grooves. The fibre core also provides additional storage space for lubricant.

Field of Application

A special traction rope for regularly frequented systems.

Advantages

- large metallic cross-section - i.e. high breaking strength in relation to diameter
- slightly more deformable cross-section
- good flexural performance with small deflections
- low permanent and elastic elongation
- Marking line for an easy installation



8 x 19 S – IWRC

DRAKO 210 TFS

Nom. Rope-Ø	Minimum breaking strength F_{min}	Length mass	Metallic cross-section
	1570	approx.	approx.
mm	kN	kg/100 m	mm²
8.0*	38.7	25.0	27.9
10.0*	60.5	40.0	43.6
13.0*	102.2	67.0	73.7
16.0*	154.9	100.0	113.5

* no stock material

Ropes for Traction Sheave Elevators
with Fibre Core (FC)

preformed, prestretched, bright, right hand, ordinary lay, lang lay on request

N/mm²

1570 and 1370/1770

≤ 0.20 %

≤ 0.40 %

see page 10

DRAKO 8 x 19 NFC

8-strand suspension ropes with natural fibre core

Field of Application

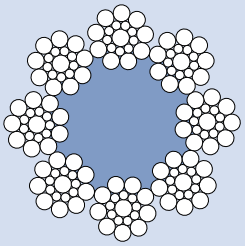
The rope construction 8 x 19 Seale – NFC, see drawing, is without doubt the worldwide most common traction drive suspension rope. But also the rope construction 8 x 19 Warrington – NFC has its market share in Germany and UK due to better fatigue bending properties.

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

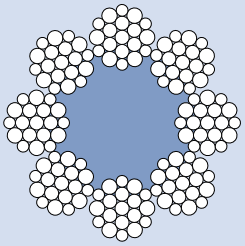
The rope quality of this rope construction depends on the quality of the fibres and the resulting fibre core. This is the reason, why DRAKO is only using DRAKO-made fibre cores.

Advantages

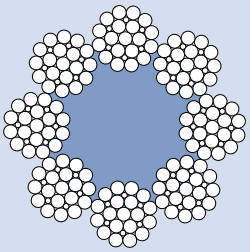
- rounder than 6-strand ropes, i.e. more contact points rope to groove
- deformable in cross-section, i.e. the new rope adapts a little bit to slightly worn out grooves
- easy to install
- Marking line for an easy installation



8 x 19 S – FC



8 x 19 W – FC



8 x 25 F – FC

DRAKO 8 x 19 S – FC

Nom. Rope-Ø	Minimum breaking strength F_{min}	Length mass	Metallic cross-section
	1570 and 1370/1770	approx.	approx.
mm	kN	kg/100 m	mm²
8.0	30.4	21.5	22.5
9.0	38.4	27.3	28.4
9.5*	42.8	30.4	31.7
10.0	47.4	33.7	35.1
11.0	57.4	40.7	42.5
12.0	68.3	48.5	50.6
13.0	80.2	56.9	59.3
14.0	93.0	66.0	68.8
15.0	107.0	75.7	79.0
15.5	114.0	80.8	84.4
16.0	121.0	86.1	89.9
18.0*	154.0	109.0	114.0
19.0*	171.0	121.0	127.0

DRAKO 8 x 19 W – FC

8.0	31.6	22.2	23.4
9.0*	40.0	28.1	29.6
10.0	49.4	34.7	36.5
11.0	59.7	42.0	44.2
12.0	71.1	50.0	52.6
13.0	83.4	58.6	61.7
16.0	126.0	88.8	93.5

DRAKO 8 x 25 F – FC

13.0*	81.0	59.0	60.0
15.0*	108.0	78.0	80.0
16.0*	122.0	89.0	91.0
18.0*	155.0	112.0	115.0
19.0*	173.0	125.0	128.0

* no stock material

Ropes for Roped Hydraulic Elevators
with Steel Core (IWRC)

preformed, prestretched, bright, right hand, ordinary lay

1770

see page 10

DRAKO 250 H

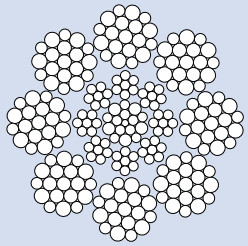
8-strand full steel rope

Field of Application

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

Advantages

- flexible, with good fatigue bending properties
- low rope diameter reduction in loaded condition, also after long periods
- low elastic and plastic elongation
- rope grade 1770 leads to very high breaking strength
- Marking line for an easy installation



8 x 19 W – IWRC

Nom. Rope-Ø	Minimum breaking strength F_{min}	Length mass	Metallic cross-section
	1770	approx.	approx.
mm	kN	kg/100 m	mm²
8.0*	46.7	27.3	31.4
10.0	72.7	43.1	48.8
13.0	126.0	72.8	83.7

* 8 x 19 S – IWRC

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

Overspeed Governor
Governor Ropes (steel ropes)

preformed, prestretched, bright, galvanized on request, right hand, ordinary lay

1370/1770, 1570, 1770, 1960 N/mm²

DRAKO
6 x 19 W – WSC ≤ 0.14 %
DRAKO 250 T ≤ 0.15 %
DRAKO 300 T and TX ≤ 0.15 %
6 x 19 S – IWRC ≤ 0.15 %
8 x 19 S – FC ≤ 0.40 %
6 x 19 S – FC ≤ 0.30 %
6 x 19 W – FC ≤ 0.30 %

see page 10

DRAKO 6 x 19 / 8 x 19 – FC – IWRC – WSC
DRAKO 250 T – DRAKO 300 T and 300 TX

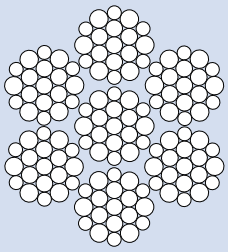
Special ropes for overspeed governor (governor ropes)

These ropes are an essential functional element of the speed limitation process and the safety gear. Since the transmission of energy usually proceeds via friction, the lubrication of the governor rope needs to be dosed exactly. Following the introduction of safety gear also effective in ascent rides, governor ropes with greater breaking strength became more necessary and this was achieved by a wider rope diameter, by a higher rope grade and a full-steel rope design.

The fibre core of the DRAKO governor ropes is made of synthetic fibres. This leads to optimal diameter stability for smaller rope diameters. In addition, the synthetic-material fibres are dampproof – and there is no swelling and no decomposing. Many DRAKO governor ropes are also available in the galvanized design.

Advantages

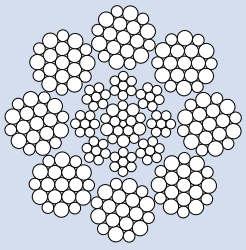
- greater reliability and system availability
- lower susceptibility to breakdown
- reduced elongation with higher vertical rises
- higher breaking strengths for reduced speed governor dimensions
- length and form stability in all environments.



6 x 19 W – WSC

DRAKO 6 x 19 W – WSC

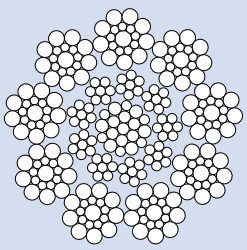
Nom. Rope-Ø	Minimum breaking strength F_{min}				Length mass	Metallic cross-section
	1370/1770	1570	1770	1960	approx.	approx.
mm	kN	kN	kN	kN	kg/100 m	mm²
6.0	–	–	–	29.0	14.5	17.6



Drako 250 T

DRAKO 250 T

6.5	–	–	31.5	–	17.9	20.6
8.0	–	43.3	46.6	–	27.3	31.6
9.0	–	54.8	–	–	34.3	40.0
10.0	–	67.7	72.7	–	42.3	49.4



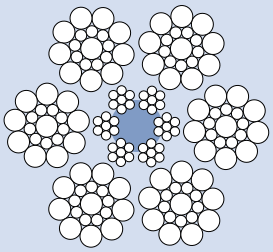
Drako 300 T and TX
Example: Ø 8.0 mm

DRAKO 300 T and TX

8.0	–	42.1	45.0	–	26.1	30.8
9.0	–	53.3	–	63.5*	32.2	38.0
10.0	–	66.0	71.0	–	42.8	49.2
13.0	–	111.6	118.3*	136.0*	72.3	84.0

* no stock material

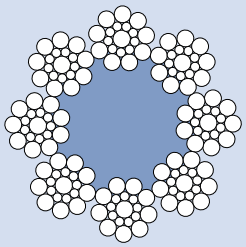
Governor Ropes (with Fibre Core)



6 x 19 S – IWRC

DRAKO 6 x 19 S – IWRC

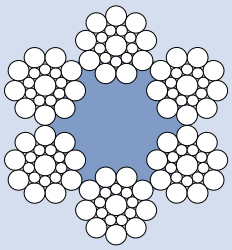
Nom. Rope-Ø	Minimum breaking strength F_{min}				Length mass	Metallic cross-section
	1370/1770	1570	1770	1960	approx.	approx.
mm	kN	kN	kN	kN	kg/100 m	mm^2
8.0	–	35.9	–	–	26.2	31.3



8 x 19 S – FC

DRAKO 8 x 19 S – FC

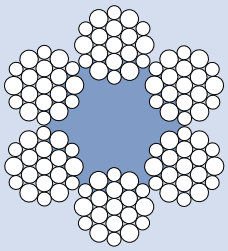
6.5	–	19.0*	–	–	14.6	13.4
8.0	–	–	34.2	–	21.5	22.5
9.5	–	–	48.3	–	30.4	31.7
10.0	47.4	47.4*	–	–	33.7	35.1
12.7	76.5*	–	–	–	54.3	56.6



6 x 19 S – FC

DRAKO 6 x 19 S – FC

6.0	–	19.0	21.4	23.3*	13.0	13.8



6 x 19 W – FC

DRAKO 6 x 19 W – FC

5.0	–	–	14.6	–	9.5	9.9
6.0	–	19.8	–	24.7*	13.2	14.3
6.3	–	–	–	27.2	14.6	15.8
6.5	23.2*	23.2	26.2	–	15.5	16.8
7.0	–	–	28.6*	–	18.0	19.5
8.0*	–	–	39.6	–	23.6	25.4

* no stock material

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

Maintenance of Ropes

Elevator Rope Maintenance

DRAKO elevator ropes are lubricated during the manufacture process with the aim of reducing corrosion and abrasion. But the quantity of lubricant so applied may only be enough to prevent elevators with sharply calculated traction capability from slipping.

Since, however, dust and abrasion tend to thicken the lubricant, it is only in rare cases that this first lubrication remains effective over the entire service life. And so DRAKO recommends that the elevator ropes be periodically relubricated during service.

Relubrication is not necessary as long as your fingers pick up a smear of oil if you touch the rope. As such, relubrication is carried out a number of ways – with a spray can or oil can or paint brush or similar. For traction drives, only small quantities need to be applied, following which the elevator should be run up and down the whole distance several times. In doing so, observe any slipping characteristics and, if necessary, apply more lubricant. The lubricant used should initially have low viscosity and good creep properties so that the inner parts of the rope are also lubricated.

For this purpose, we recommend two DRAKO special rope lubricants: either **DRAKO-LUBE** or **DRAKO-SOL**, which are both compatible with the lubrication applied at manufacture. As a further alternative, **DRAKO-Outdoor** has stood the test of time in use outdoors. It comes as a paste but takes on fluid form in the course of operation.

Transparent and of low viscosity, **DRAKO-LUBE** and **DRAKO-SOL** are able to penetrate the rope even under load. During non-operational phases, they flow back to the rope contact points from which they were displaced during rope/elevator operation.

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

Attention: The automatic lubricators available nowadays may only be used at a specific elevator for a very limited period of time. Otherwise, excess lubrication soon occurs with the attendant risk of rope slip.

Over-lubricated ropes can be degreased by means of our special chemically neutral **DRAKO-FLORIDEAL** rope degreasing powder.

Please Note:

Our lubricants contain solvents (except for DRAKO-FLUID SF)!

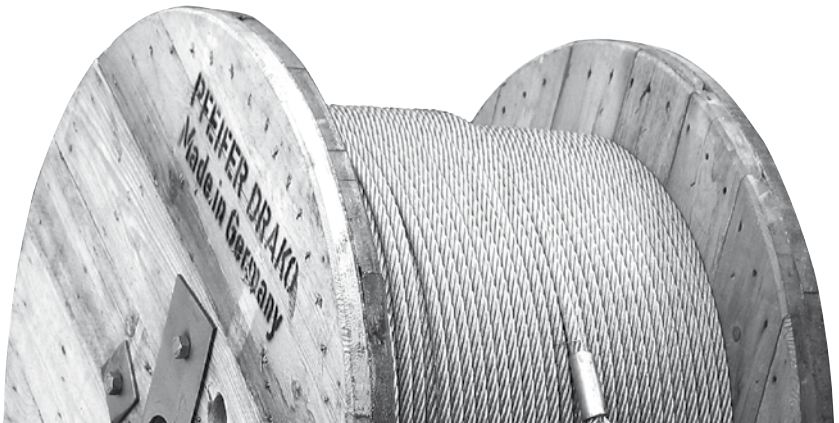
Only to be used in well ventilated areas.

DRAKO rope maintenance products are designed to conform to the basic lubrication that DRAKO ropes receive at manufacture. If other products are used, no warranty for conformance can be offered. This also applies to the rope maintenance products of other manufacturers.

It is imperative that you consult the information given for the use and maintenance of elevator ropes made of steel wire as per EN 12385-3.

Article	Condition as delivered	Operating conditions	Container size	Solvent	Application by means of
DRAKO-LUBE	fluid	indoor and outdoor	2.5-l-can 5.0-l-can	Yes Yes	brush/roller
DRAKO-SOL[1)]	fluid	indoor	spray can 500 ml (12 cans = 1 box)	Yes Yes	spray
DRAKO-FLUID SF	fluid	indoor and outdoor	2.5-l-can 5.0-l-can	No No	automatic lubricator, brush/roller, squirt gun
DRAKO-Outdoor	fluid/paste	outdoor	10-kg-can	Yes	brush/roller
DRAKO-Florideal	Rope degreasing powder	indoor and outdoor	25-kg-bag 5-kg-pot with lid	– –	gloves

[1)] hazardous substance, observe all transport regulations!



Accessories

WeightWatcher MSM12

The right rope tension has an massive impact onto the rope lifecycle expectation

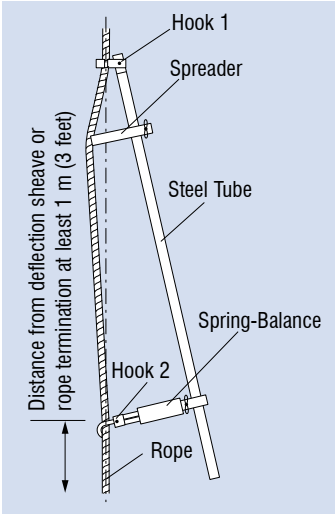
Insufficiently adjusted ropes and excessive total weights result in undesirable and premature wear. Thanks to the WeightWatcher rope load measuring system the rope adjustment and the weighing of car and counterweight becomes child's play. Due to the patented measuring principle the exact loads in each rope can be measured, within seconds, without the necessity of prior calibration with weights.

The integrated rope adjustment wizard will guide you through the rope adjustment and logs each measurement in a report that can later be manipulated on the PC. This makes the WeightWatcher the optimum tool for your service to customers.

Advantages

- measurement of up to 12 ropes
- measurement of single loads and total weight
- rope tension assistant for quick cable adjustment
- convenient menu with settings of the suspension variant, unit weight, tolerance
- storage of complete documentation
- color touch screen for easy operation
- advanced lithium-ion batteries
- BlueTooth can be connected via android app with smartphones / tablets

For more information please see our leaflet 'Weight Watcher'.



Wire Rope Tensioning Device

Equal rope tension adds to the life of the elevator ropes and the sheaves.

- The attached manual contains all relevant instructions on the use of the device and the assessment of measured values.

Advantages

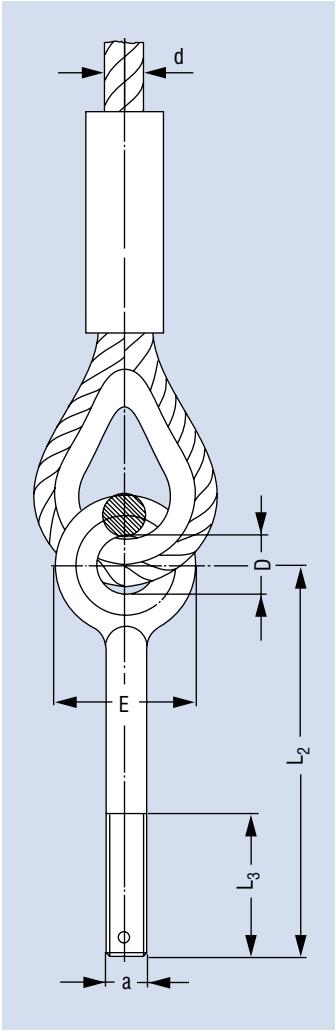
- light-weight design, easy to handle
- comparable measured values for a set of ropes

Running-off crown VARIO CLOU

Improper pulling from the rope ring causes twisting depending on direction of lay of the rope. This twisting causes a change in the rope structure, which cannot be corrected. Unequal strand lengths in steel-cored ropes occur through these forced twistings. The consequence is an unequal load distribution in the rope coil which can lead to 'bird caging' of strands which have experienced an excess length.

In order to avoid such an irreversible damage to the rope there are auxiliary means, such as the **VARIO CLOU** running-off crown. It enables an unreeling of the rope without any twisting.

Rope Terminations



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

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

Eye Bolts

Rope-Ø d	Nominal size (a x L_2)	L_3 (approx.)	D	E (approx.)
mm		mm	mm	mm
6.0 – 8.0	M 12 x 260	60	26.0	50.0
	M 12 x 350	150	26.0	50.0
	M 12 x 500	150	26.0	50.0
9.0 – 11.0	M 16 x 260	120	22.0	51.4
	M 16 x 300	150	22.0	51.4
	M 16 x 350	200	22.0	51.4
	M 16 x 400	200	22.0	51.4
	M 16 x 450	200	22.0	51.4
	M 16 x 500	200	22.0	51.4
12.0 – 14.0	M 20 x 290	120	27.7	67.6
	M 20 x 450	200	27.7	67.6
	M 20 x 600	200	27.7	67.6
15.0 – 17.0	M 24 x 400	220	27.0	65.0
	M 24 x 600	200	27.0	65.0

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

Please note:

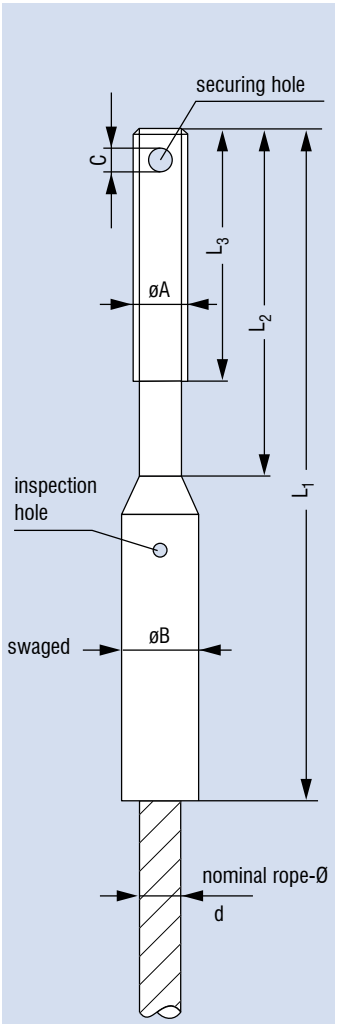
The elevator rope constructions shown in this catalogue have very different minimum breaking strengths. When specifying rope terminations and springs or spring buffers, their respective maximum applicable force is to be considered.

Rope terminations are to be secured against rotation.

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
FP	1 elastomer spring, 1 washer
FP 2	2 elastomer springs, 1 washer
FP 3	3 elastomer springs, 1 washer

TÜV Süd approved!



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.

'TÜV Süd' has 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 for DRAKO-Ropes with fibre cores as well as for DRAKO-Ropes with steel core.

DRAKO swaged fittings with thread are compliance tested by TÜV Süd!

Please note:

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

Rope-Ø d	Nominal size	Thread-Ø A	Thread length L_3 approx.	Shaft length L_2 approx.	Swaged Ø B approx. [1]	Swaged Total length L_1 approx. [1]	Securing hole Ø C
mm		mm	mm	mm	mm	mm	mm
4.0	M 8 x 140	M 8	140	140	10.5	185	3
5.0	M 10 x 140	M 10	140	140	14.5	194	3
6.0	M 10 x 235	M 10	60	236	14.5	308	3
6.0	M 10 x 145	M 10	45	45	14.5	145	3
6.5	M 10 x 235	M 10	60	236	14.5	310	3
8.0*	M 14 x 160	M 14	160	163	16.0	240	6
8.0**	M 14 x 300	M 14	200	300	16.0	380	6
10.0*	M 16 x 160	M 16	160	163	18.0	260	8
10.0**	M 16 x 300	M 16	200	300	18.0	400	8
11.0*	M 16 x 160	M 16	160	163	20.5	270	8
11.0**	M 16 x 300	M 16	200	300	20.5	410	8
12.0*	M 16 x 160	M 16	160	163	22.5	280	8
12.0**	M 16 x 300	M 16	200	300	22.5	420	8
13.0*	M 20 x 160	M 20	160	163	24.5	280	8
13.0**	M 20 x 300	M 20	200	300	24.5	420	8
16.0*	M 24 x 160	M 24	160	163	29.0	310	8
16.0**	M 24 x 350	M 24	250	350	29.0	500	8

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

** normal size

[1] provided only as information for determining installation dimensions

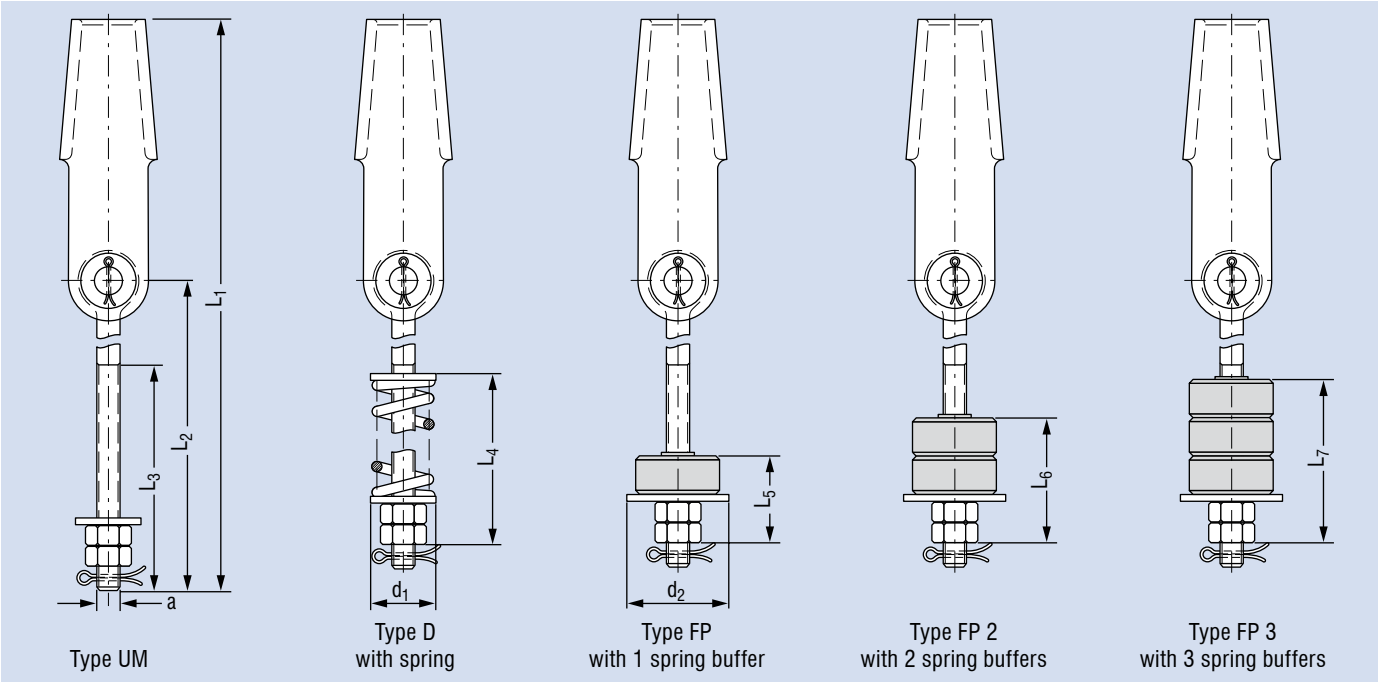
Symmetric Wedge Socket EN 13411-7 with Eye Bolt DIN 444

Termination acc. to EN 13411-7 in combination with our eye bolts fulfil the requirement of EN 81, to withstand at least 80 % of the minimum breaking strength even when used together with the fullsteel ropes DRAKO 250 H.

Please note:

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

Rope terminations are to be secured against rotation.



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

Rope-Ø d	Nominal size socket	a	Normal size Type UM L_1	L_2*	L_3	weight	Type D d_1	L_4	weight	Type FP d_2	L_5	weight	Type FP 2 L_6	weight	Type FP 3 L_7	weight
mm			mm	mm	mm	appr. kg	mm	mm	appr. kg	mm	mm	appr. kg	mm	ca. kg	mm	appr. kg
4.0 – 5.0	5.0	M 10	276	180	70	0.420	25.0	85.5	0.510	40.0	38	0.361	55	0.373	72	0.384
5.0 – 6.5	6.5	M 10	264	180	70	0.380	25.0	85.5	0.470	40.0	38	0.401	55	0.414	72	0.424
6.0 – 8.0	8.0	M 12	450	320	150	0.780	45.0	167	1.420	50.0	51	0.870	79	0.900	107	0.930
9.0 – 11.0	11.0	M 16	484	320	150	1.650	45.0	173	2.490	58.0	59	1.785	87	1.815	115	1.850
12.0 – 14.0	14.0	M 20	598	400	150	3.230	54.0	202	4.500	68.0	65	3.530	93	3.570	121	3.610
15.0 – 17.0	17.0	M 24	674	450	150	5.300	65.0	248	8.150	80.0	74	5.830	102	5.910	130	5.990
18.0 – 20.0[1)]	20.0	M 27	760	500	150	8.000	65.0	254	10.950							
21.0 – 25.0[1)]	25.0**	M 30	740	500	150	11.000	80.0	251	14.500							

* normal size
Different lengths L_2 see page 28 table Eye Bolts.

** not acc. to DIN

[1)] on request

The socket body is galvanized.

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

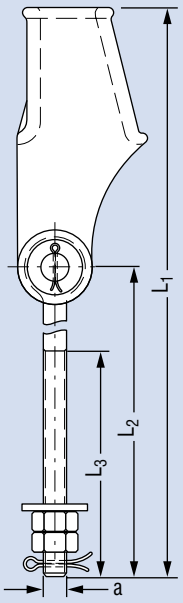
Asymmetric Wedge Socket DIN 43 148 (EN 13411-6) with Eye Bolt similar to DIN 444

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 (Requirement: withstanding at least 80 % of the rope's minimum breaking strength).
Please contact us in case of any questions.

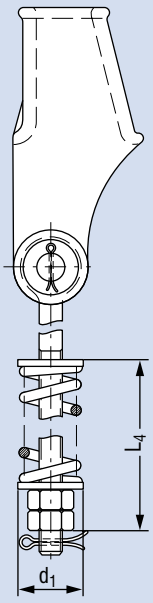
Please note:

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

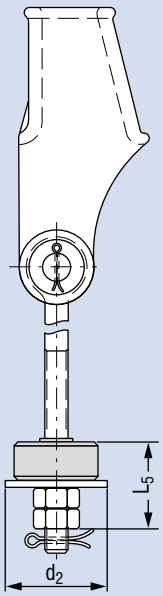
Rope terminations are to be secured against rotation.



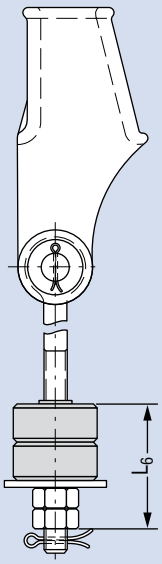
Type KUM



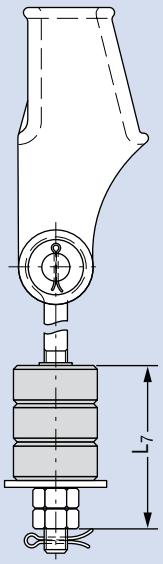
Type KD
with spring



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 socket	a	Normal size Type KUM L_1	L_2*	L_3	weight	Type KD d_1	L_4	weight	Type KFP d_2	L_5	weight	Type KFP 2 L_5	weight	Type KFP 3 L_5	weight
mm			mm	mm	mm	appr. kg	mm	mm	appr. kg	mm	mm	appr. kg	mm	appr. kg	mm	appr. kg
6.0 – 7.0	353	M 12[1)]	430	300	150	0.948	44.0	167	1.595	50.0	51	1.051	79	1.079	107	1.107
8.0	352	M 12[1)]	430	300	150	0.920	44.0	167	1.567	50.0	51	1.023	79	1.051	107	1.079
9.0 – 12.0	351	M 12[1)]	430	300	150	0.892	44.0	167	1.539	50.0	51	0.995	79	1.023	107	1.051
10.0 – 12.0	402	M 16	440	300	150	1.278	44.0	173	2.070	57.0	59	1.454	87	1.482	115	1.510
12.0 – 14.0	401	M 16	440	300	150	1.250	44.0	173	2.042	57.0	59	1.426	87	1.454	115	1.482
12.0 – 15.0	450	M 20[1)]	590	400	150	3.330	50.0	202	4.840	68.0	65	3.620	93	3.666	121	3.712
16.0 – 20.0[2)]	500	M 27[1)]	715	500	150	7.740	65.0	254	10.760							

* normal size
Different lengths L_2 on request.

[1)] Eye of bolt not acc. to DIN

[2)] on request

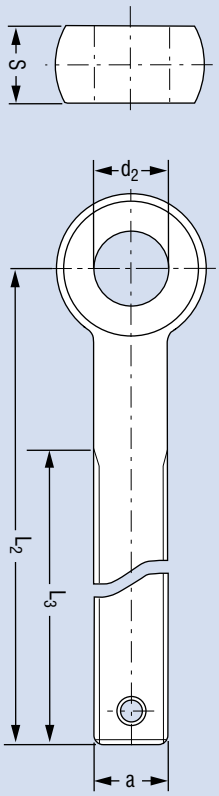
The socket body is galvanized.

How to order (example) **Type 402 KD x length L**

Asymm. 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 EN 13411-7)

thread a	M 10**	M12	M 16	M 20	M 24	M 27	M 30**
d_2	10.5	12.2	16.0	18.0	22.0	25.0	42.0
s	9.0	14.0	17.0	22.0	25.0	27.0	30.0
L_2 / L_3	180/70*		200/100				
	130/35						
	230/70		300/150	300/150			
		320/150*	320/150*				
			350/150				
		400/150	400/150	400/150*			
			450/150	450/150	450/150*		
			500/150			500/150*	500/150*
				560/150	600/150		
						800/400	

All dimensions in mm

* normal sizes
Sizes in bold type are usually available ex stock.

** not acc. to DIN

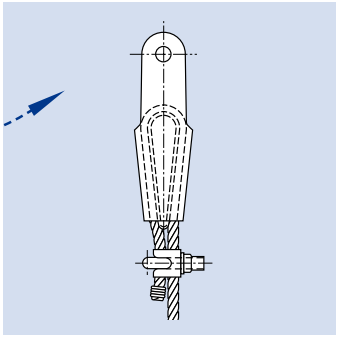
Wire Rope Grips EN 13411-5

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

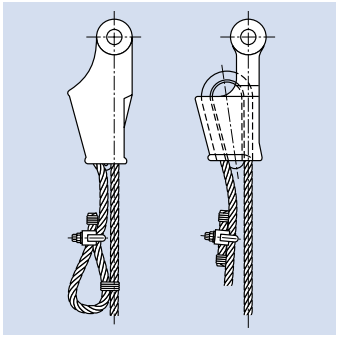
nominal size = biggest nominal rope-Ø	5.0	6.5	8.0	10.0	12.0	14.0	16.0	19.0	22.0

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 13411-5.

Standardised Fixing of Rope End with Wire Rope Grip



Symmetric wedge socket:
see EN 13411-7



Asymmetric wedge socket:
see EN 13411-6

Springs for Rope Terminations

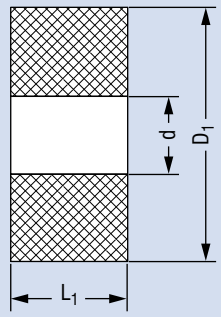
	Spring I	Spring II	Spring III	Spring IV	Spring V	Spring VI
symm. wedge socket EN 13411-7/DIN 15 315	5 D 6.5 D	8 D	11 D	14 D	17 D 20 D	25 D
asymm. wedge socket EN 13411-6/DIN 43 148	–	351 352	401 402	450	500	–
swaged fitting	M 8 M 10	M 12	M 16	M 20	M 24	–
wire-Ø [mm]	4.5	7.5	9.0	11.0	15.0	18.0
outer-Ø [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)



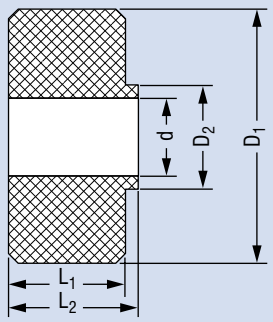
Elastomer Spring Buffers for Rope Terminations

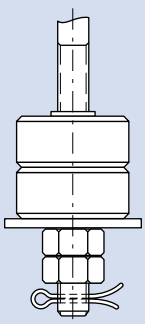
Characteristics

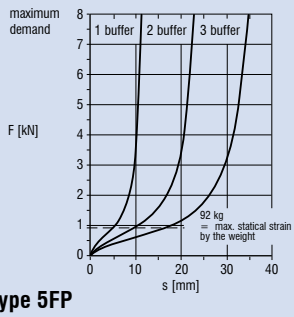
- grease and oil resistant
- excellent damping properties
- material: cellular polyurethane-elastomer

Type	d	D_1*	D_2*	L_1*	L_2*
	mm	mm	mm	mm	mm
5.0	10.0	40	20	17	20
8.0	13.0	50	22	28	33
11.0	17.0	50	22	28	33
14.0	21.0	65	27	28	33
17.0	25.0	80	27	28	33

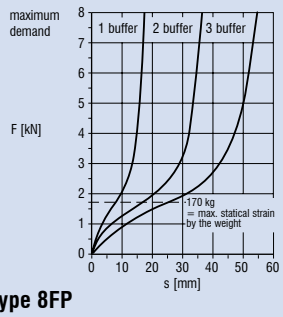
* unloaded
Dimension d must fit to the thread diameter a of the eye bolt



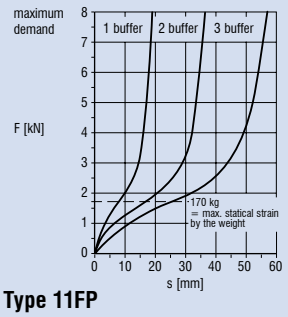




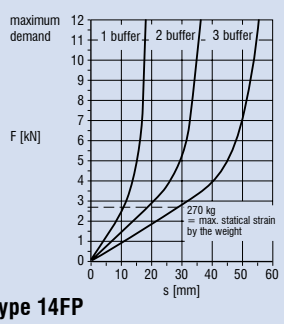
Type 5FP



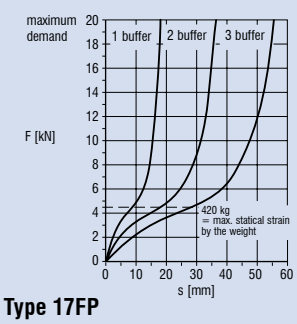
Type 8FP



Type 11FP



Type 14FP



Type 17FP

Compensation

Compensation for Elevator Suspension Rope Weight

Why is compensation under certain circumstances useful or even necessary?

Good reasons for weight compensation:

- In high elevators, the power consumption of the electrical drive system can be minimized by rope weight compensation; alternatively, the drive system can be dimensioned for smaller loads, and the power supply to be installed can thus be reduced.
- The car can be started and stopped much more smoothly, and the calculation of the approach speed of the car to the next stop is optimized.
- The traction properties required for elevators with long hoistways can often only be achieved by means of weight compensation.

Depending on the hoisting height, car speed and purpose of the elevator, chains or ropes can be used for this purpose:

- Standard balance chain without jacket:
  – for nominal speeds up to 0.6 m/s.
  – Disadvantage: High noise level

- Balance chain with jacket, whereby the chain structure is still visible: for nominal speeds up to 1.6 m/s e. g.
- Balance chain with jacket, round cross-section:
  – for nominal speeds up to 3.0 m/s. e. g. DRAKO CB.
  – For speeds from 1.75 m/s it is recommended to install balance chain guides in the lower hoistway section.

In addition to above mentioned applications DRAKO offers compensating chains which provide a bigger loop diameter. So the pressure on the car guides can substantially be reduced.

For compensating ropes there are the following differences:

- Untensioned balance ropes: Previously common with certain specifications (tiller ropes); the run behaviour of such ropes is however inferior to that of jacketed balance chains.
- Tensioned balance ropes: According to EN 81-1, 9.6 or EN 81-20 5.5.6.2, ropes used as balance ropes are to be run with tensioning sheaves. Only tensioned weight compensating ropes in conjunction with the securing devices on the tensioning sheaves as required by EN 81-1, 9.6.2 or EN 81-20 5.5.6.1, for nominal speeds above 3.5 m/s can prevent the feared ‘jumping’ of the counterweight upon activation of the safety brake.

Up to recently, balance ropes were produced with the same ropes construction and diameter as the suspension rope in the respective installation. DRAKO will of course continue to supply its customers with such solutions. For high hoistways (rope oscillation!) and/or more than six suspension ropes (with the necessary intricate tensioning roller system), operators should consider the installation of less but thicker balance ropes.

Advantages of specifically designed balance ropes

DRAKO recommends the use of specifically designed and dimensioned balance ropes of the product series DRAKO 180 B and DRAKO 200 B. These ropes feature a synthetic fibre core and, in certain cases, a strand construction that is not available for suspension ropes.

- **Flexibility**
  This construction consists of a many thin wires, making the ropes particularly flexible (minimum diameter ratio D/d for balance rope sheaves is 30 only!).

- **Length stability**
  In contrast to natural fibre cores, synthetic fibre cores don't absorb moisture from the ambient air. Elongation and contraction (that can exceed the tensioning length in the case of long ropes) as a result of fluctuating humidity are thus effectively prevented.

- **Special lubrication**
  Compensating ropes are lubricated differently and also more extensively than traction ropes, as minimum friction is not an issue. This results in a prolonged service life of the installation combined with longer servicing intervals.

- **Fibre core**
  Under certain circumstances, steel cores in compensating ropes might lead to early damage. Synthetic fibre cores however provide excellent reliability under all conditions.

- **Easy handling**
  The ropes are of pre-formed regular lay construction, which significantly reduces the tendency of becoming untwisted during handling and installation.

- **Safety factor**
  In respect of EN 81-20 5.5.6.3 compensation-chains and –ropes have to be able to withstand any forces acting on them with a safety factor 5.

To assess whether a rope is to be replaced, please refer to chapter Discard Criteria on page 11.

Special Compensating Ropes

preformed, bright, right hand, ordinary lay, made with a synthetic fibre core (SFC)

1370/1770 or 1570

see page 10

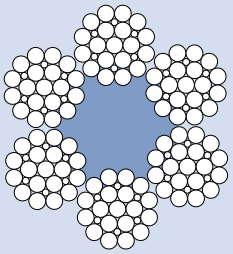
DRAKO 180 B / 200 B

Special compensating ropes for elevators to be used as tensioned balance ropes only.

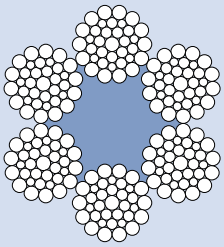
Special compensating ropes (balance ropes), to be used in tensioned application only. The rope construction varies with the nominal diameter to optimize the performance.

The purpose and the operating conditions of weight compensating ropes are different to those of traction sheaves and suspension ropes used in the same elevator systems. Which is why DRAKO recommends the use of special compensating ropes. **Abundant lubrication and a special fibre core**, a selection of even wider rope diameters (for fewer ropes) and a flexible rope design adapted to the rope diameter will all go towards a longer service live, quietness of running and stability of length.

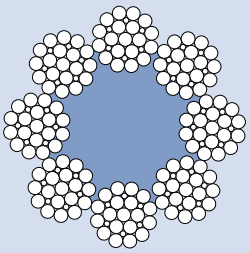
However, as always, DRAKO can deliver compensating rope in the same design as that of the suspension rope like DRAKO 300 T.



6 x 25 F – FC



6 x 36 WS – FC



8 x 25 F – FC

DRAKO 180 B

Nom. Rope-Ø mm	Minimum breaking strength F_{min} 1370/1770 or 1570 kN	Length mass approx. kg/100 m
13.0	83.7	60.7
16.0	127.0	92.0
18.0	160.0	116.0
19.0*	179.0	130.0
20.0*	198.0	144.0
22.0*	240.0	174.0
24.0*	292.0	211.0
26.0*	342.0	248.0
32.0*	518.0	376.0
36.0*	656.0	476.0
38.0*	731.0	530.0

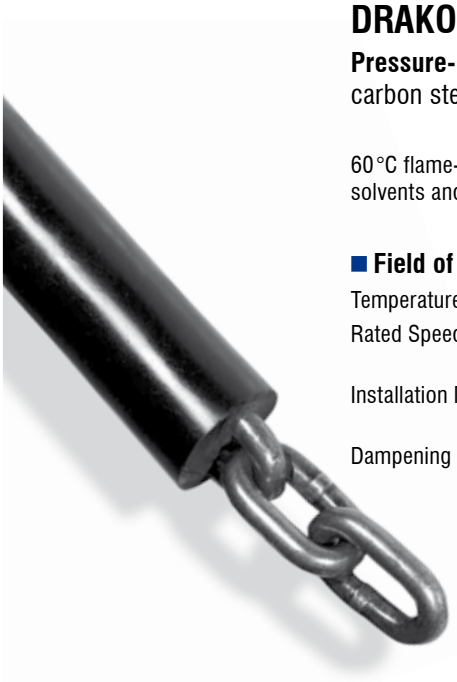
DRAKO 200 B

13.0*	74.3	57.5
16.0*	113.0	87.0
18.0*	142.0	110.0
19.0*	159.0	123.0
22.0*	213.0	165.0

* no stock material

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

Compensating Chains



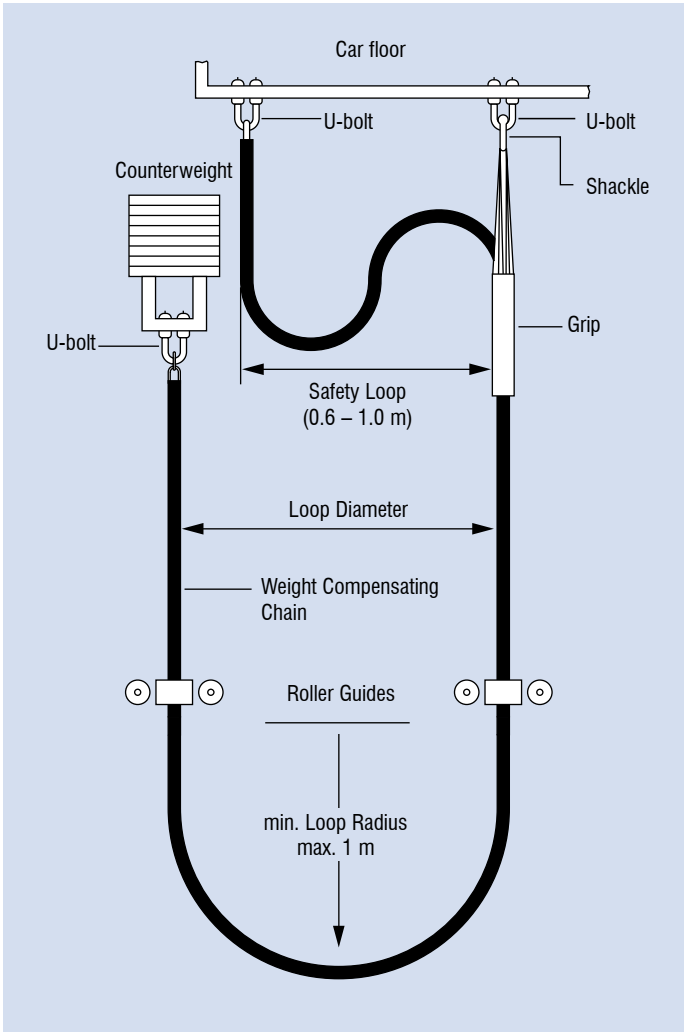
DRAKO comfortBalance

Pressure-extruded. automatically-welded chain made of low-carbon steel

60 °C flame-retardant polyvinyl chlorine that resists oxidation, weathering, solvents and chemicals.

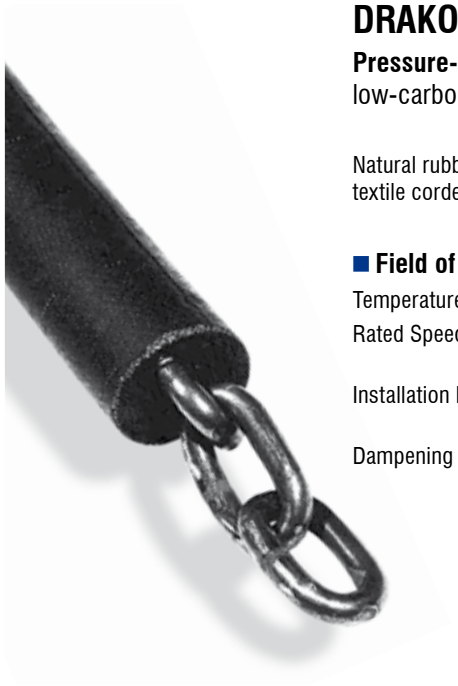
Field of Application

Temperature Range	–15 °C to +60 °C
Rated Speed	≤ 3.0 m/s (acc. EN 81-20/-50) ≤ 3.5 m/s (acc. EN 81-1)
Installation Material	3 U-bolts, 1 shackle, 1 grip
Dampening Device	DRAKO Roller DR-L and DR-H



Type	Unit weight	Chain diameter	External diameter	Max. hanging length	Recom. loop diameter
	kg/m	mm	mm	m	mm
DRAKO CB 110	1.1	5.5	24	150	560
DRAKO CB 150	1.5	6.3	29	170	600
DRAKO CB 220	2.2	7.9	35	180	600
DRAKO CB 300	3.0	9.0	38	185	650
DRAKO CB 370	3.7	10.5	42	185	650
DRAKO CB 450	4.5	11.5	44	185	650
DRAKO CB 520	5.2	12.7	49	185	680
DRAKO CB 600	6.0	13.5	52	185	680

Please note
For outdoor application dampening devices are always advisable because of the influence of wind.



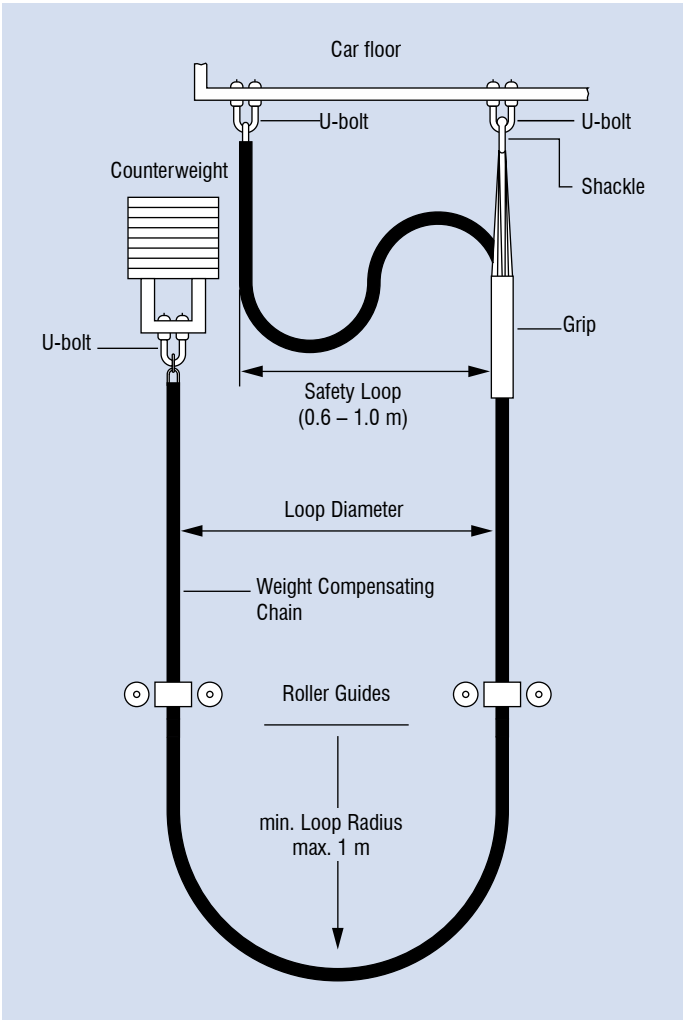
DRAKO halogenfreeBalance

Pressure-extruded, automatically-welded chain made of low-carbon steel

Natural rubber that resists oxidation, weathering, solvents and chemicals, textile corded.

Field of Application

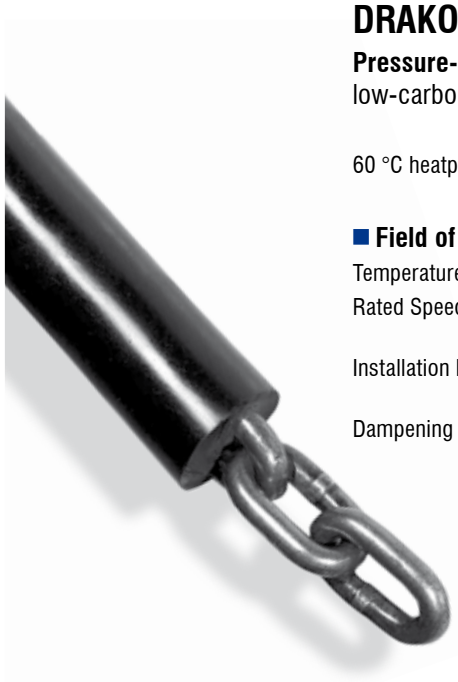
Temperature Range	–50 °C to +60 °C
Rated Speed	≤ 3.0 m/s (acc. EN 81-20/-50) ≤ 3.5 m/s (acc. EN 81-1)
Installation Material	3 U-bolts, 1 shackle, 1 grip
Dampening Device	DRAKO Roller DR-L and DR-H



Type	Unit weight	Chain diameter	External diameter	Max. hanging length	Recom. loop diameter
	kg/m	mm	mm	m	mm
DRAKO HFB 110*	1.1	5.5	24	150	480
DRAKO HFB 150*	1.5	6.0	29	170	510
DRAKO HFB 220*	2.2	8.0	35	180	530
DRAKO HFB 300*	3.0	9.0	38	185	560
DRAKO HFB 370*	3.7	10.5	42	185	610
DRAKO HFB 450*	4.5	11.5	44	185	660
DRAKO HFB 520*	5.2	12.7	49	185	720
DRAKO HFB 600*	6.0	13.5	52	185	720

* no stock material

Please note
For outdoor application dampening devices are always advisable because of the influence of wind.



DRAKO widerloopChain

Pressure-extruded, automatically-welded chain made of low-carbon steel

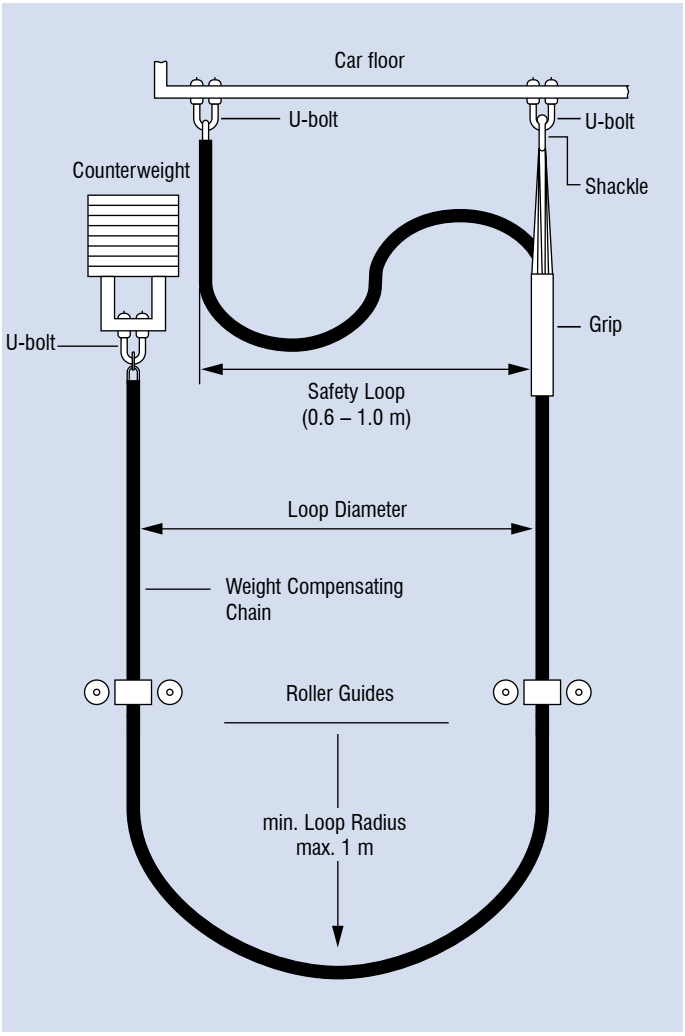
60 °C heatproof PVC resistant to weathering, solvents and chemicals.

Field of Application

Temperature Range	0 °C to +60 °C
Rated Speed	≤ 3.0 m/s (acc. EN 81-20/-50) ≤ 3.5 m/s (acc. EN 81-1)
Installation Material	3 U-bolts, 1 shackle, 1 grip
Dampening Device	DRAKO Roller DR-L and DR-H

Advantages

- special PVC composition results in a distinct wider loop diameter than conventional weight compensating chains
- permits a centred installation process under the car even with wide shafts and large cars
- pressure on the car guides substantially reduced, wear-and-tear minimized
- improved shaft efficiency



Type	Unit weight	Chain diameter	External diameter	Max. hanging length	Recom. loop diameter
	kg/m	mm	mm	m	mm
DRAKO WLC 110	1.1	5.5	24	150	1000 – 1600
DRAKO WLC 150	1.5	6.3	29	170	1000 – 1600
DRAKO WLC 220	2.2	7.9	35	180	1000 – 1600
DRAKO WLC 300	3.0	9.0	38	185	1000 – 1600
DRAKO WLC 370	3.7	10.5	42	185	1000 – 1600
DRAKO WLC 450	4.5	11.5	44	185	1000 – 1600
DRAKO WLC 520	5.2	12.7	49	185	1000 – 1600
DRAKO WLC 600	6.0	13.5	52	185	1000 – 1600

Please note
For outdoor application dampening devices are always advisable because of the influence of wind.

Installation Kits

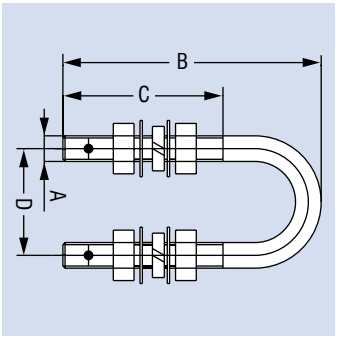
Installation Kits for DRAKO CB and HFB

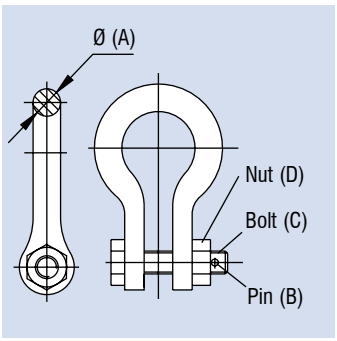
One installation kit contains the material for the installation of one balance chain.

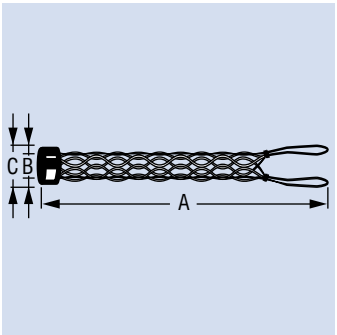
The installation kits were specifically designed for use with DRAKO compensating chains.

They guarantee safe operation.

The use of other hardware could seriously jeopardize the safety of the installation







CB/Kit	Content	Quantity	Dimensions			
			A	B	C	D
		pcs	mm	mm	mm	mm
ICB 110	U-bolt	3	6	120	75	50
	Shackle	1	8	1.6 x 20	M 6 x 35	M 6
	Stainless steel grip	1	710 +/- 10	26	42	–
ICB 150	U-bolt	3	8	120	75	50
	Shackle	1	12	2 x 20	M 8 x 45	M 8
	Stainless steel grip	1	710 +/- 10	31	47	–
ICB 220	U-bolt	3	10	120	75	50
	Shackle	1	12	2.5 x 30	M 10 x 50	M 10
	Stainless steel grip	1	710 +/- 10	37	53	–
ICB 300	U-bolt	3	10	120	75	50
	Shackle	1	12	2.5 x 30	M 10 x 50	M 10
	Stainless steel grip	1	710 +/- 10	40	56	–
ICB 370	U-bolt	3	12	120	75	50
	Shackle	1	12	3.2 x 30	M 12 x 50	M 12
	Stainless steel grip	1	710 +/- 10	44	60	–
ICB 450	U-bolt	3	12	120	75	50
	Shackle	1	12	3.2 x 30	M 12 x 50	M 12
	Stainless steel grip	1	710 +/- 10	47	63	–
ICB 520	U-bolt	3	14	120	75	50
	Shackle	1	16	3.2 x 30	M 14 x 60	M 14
	Stainless steel grip	1	710 +/- 10	51	67	–
ICB 600	U-bolt	3	14	120	75	50
	Shackle	1	16	3.2 x 30	M 14 x 60	M 14
	Stainless steel grip	1	710 +/- 10	54	70	–

A detailed installation manual is available.
Please inquire for further information if necessary.

Roller Guides

Roller Guide DR-L / DR-H

The DR-L and DR-H roller guides ensure that with higher ride speeds there are no vibrations in the elevator system. To select the right type, please consult the following table. It is recommended that in the case of a shaft height of over 50 m and a travel speed of over 1.75 m/s, two rollers be deployed.

For shaft heights of less than 50 m and speeds of less than 1.75 m/s, the use of guides is normally not required.

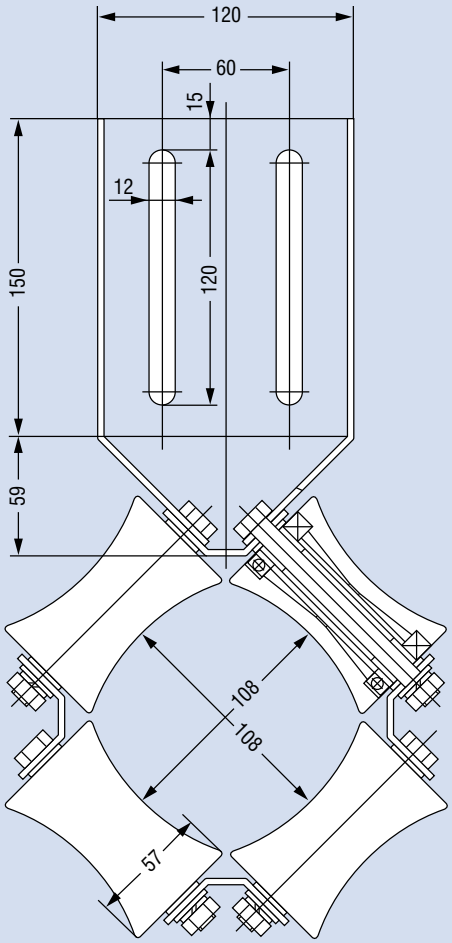
The guides dampen the vibrations that can emerge as the result of high operating speeds or as the result of an emergency stop. They prevent the chain from possibly beating against the wall of the shaft. That being so, guides might be useful at lower speeds as well.

Please note:

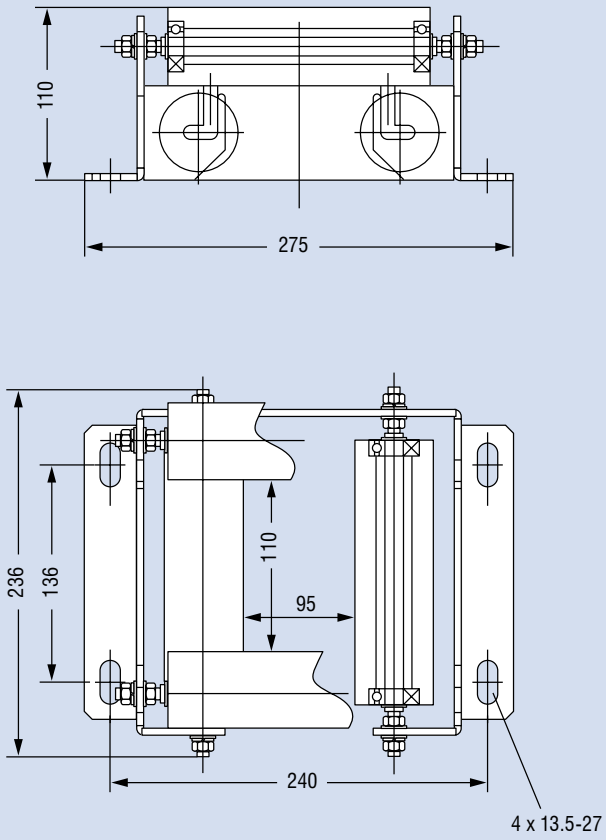
During installation, ensure that the weight compensating chain during operation will not constantly touch the roller guide unit. The chain must be centred in the middle.
It is imperative that the suspension points at the car and/or the counterweight are aligned vertically over the guide.

The table below gives a good overview of the roller guides available:

Type/ Elevator Speed	DRAKO CB	DRAKO HFB
1.2 to 1.75 m/s	DR-L / DR-H	DR-L / DR-H
1.75 to 3.0 m/s	DR-H	DR-H



Dampening Roller DR-L All dimensions in mm



Dampening Roller DR-H All dimensions in mm

Installation Material

Installation Material IK-R

For Roller Guides – Mounting Bracket to be installed between Counterweight Guide Rails (IK-R)

The bracket will be fixed between the guide rails of the counterweight. Depending on the number of compensation chains installed at the counterweight, one or two dampening rollers can be installed.

A space of minimum 480 x 290 mm for one centred dampening roller is required between the guide rails. The bracket should have approx. 80 mm distance between shaft wall and counterweight guide rails. Length can be adjusted to maximum 1500 mm between the guide rails.

Installation Material IK-F

For Roller Guides on shaft floor – Mounting Bracket to be installed at pit floor at car side (IK-F)

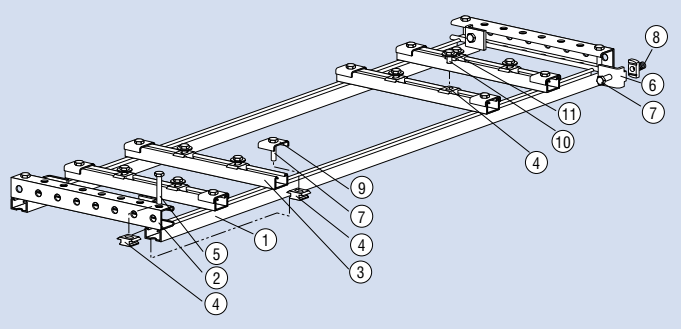
The bracket will be installed at the pit floor under the car. Depending on the number of compensation chains installed at the counterweight, one or two dampening rollers can be installed.

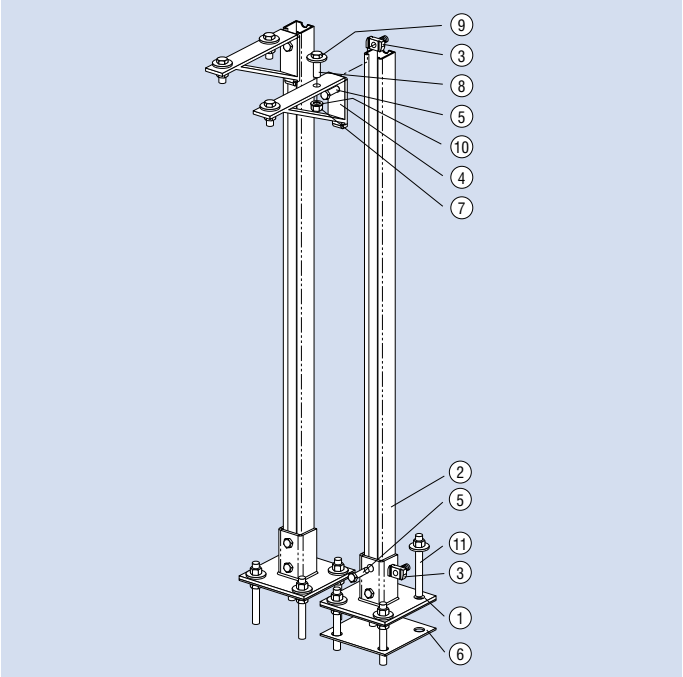
IK-R for DR-H mounting

Pos.	Part	Quantity
1	Rail D – 1500 mm	2
2	Rail A – 392 mm	2
3	Rail D – 392 mm	4
4	Rail nut M 10	20
5	Bolt – M 10 x 60	4
6	Beam clamp	4
7	Bolt – M 10 x 40	12
8	Spring nut M 10	4
9	Square washer	8
10	Bolt – M 10 x 25	8
11	Washer – 10.5	8
–	Installation Procedure	1

IK-F for DR-H mounting

Pos.	Part	Quantity
1	Floor plate – 150 mm	2
2	Rail A – 1100 mm	2
3	Spring nut M 10	6
4	Angle bracket – 244 mm	2
5	Bolt M 10 x 40	6
6	Rubber plate	2
7	Bolt M 12	4
8	Bolt M 12 x 40	4
9	Washer 13	4
10	Spring washer A12	4
11	Dowel 12	8
–	Installation Procedure	1





Dampening Rollers are not part of the installation material!

Installation guide for compensating chains and accessories is available at www.drako.de/en

Delivery Programme

Elevator Industry

- special ropes of 6-strand and 8-strand construction
- special ropes with 9 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

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

For further information please contact us.

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

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

Approvals and certifications

- TÜV Süd
- Approved by Germ. Lloyd, Lloyd's Register of Shipping
- Quality Managementsystem acc. EN ISO 9001
- Environmental-Management-system acc. EN ISO 14001
- Energy-Managementsystem acc. EN ISO 50001
- LOM (Spain)
- GOST (Russia)

Our Service

General Service

Technical support

Using the large number of technical configurations available to us, we are pleased to assist you in finding the right solution and combination for your ropes and rope accessories.

As early as the planning and design phases, we will support and advise you as extensively as possible. In addition to years of experience, we have all kinds of calculation aids for elevator rope requirements. We can help you select the best rope for your purposes, understand the rope drive & elevator system and advise you accordingly.

These are the services we offer:

Rope lifecycle calculation and rope selection (DRAKO Rope Lifecycle Calculator)

Our Technical Competence Center (TCC) has gathered far-reaching experience in the field of rope service life assessment and this has led to the creation of professional software. Even so, the software program requires that its technicians have a deep understanding of all the complex processes that also run in the background. After all, a service life assessment worth the name means more than knowledge of loads, sheaves and groove forms alone. An end-user version of this sophisticated program is available which will help you greatly when it comes to the design of your system.

Further the proven DRAKO Rope Selector has been implemented into this tool. It helps to calculate the rope drive of your traction sheave elevator as per EN 81 and, additionally, many any significant values based on standards in place. In this way, we can assess and/or modify the actual choice of rope as well as the effect of the influential components. The result: we can recommend you the best-possible coordinated rope drive system.

Get your account free of charge at **www.drako.de/en**

Rope and system diagnosis

Unexpected damage to rope can never be ruled out in elevator systems, and sometimes the cause cannot be established – at least at first. Our highly experienced experts will help you pinpoint the cause of damage and ensure that the same malfunction does not re-occur after the rope has been changed.

We are happy to advise you free of charge! In the case of more extensive calculations and services having to be provided, we would be pleased to make you an offer.

Simplified order form

We aim to make the selecting and ordering procedures as easy as possible. To do so, please use our special fax order form which you can copy at will. Alternatively, feel free to order or to place a query at:
info@drako.de

Stock keeping

For your convenience, we permanently keep in stock all sizes of weight compensating chains and over 80 different rope types and diameters for elevator operations. In fact, there are approx. 1,600 kilometers of rope in our warehouse at any one time, meaning that (subject to prior sale) we can respond swiftly to your delivery requirements.

Systemized deliveries / ropes and accessories from a single source

Do you need our ropes and/or compensating chains complete with accessories at the building site?

➜ We offer tailor-made solutions for ready-packed systemized deliveries.

Response within 24 hours

WIf it is foreseeable that we cannot reply to your query in the desired time, we will get back to you within one workday after receipt of your message and let you know:

- who your contact person is, and,
- by when exactly you can expect the reply you need.

Homepage

You can find all the technical data on our website at **www.drako.de/en**

"Our goal is your satisfaction. Not just via our products but also via our service"

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.

Production lengths will be commissioned on **wooden reels** which can be returned. These reels can also be packed (flat) on **EURO-pallets**.

Cut-to-lengths, usually commissions of more than 100 meters single length, will be dispatched on **non-returnable** reels on pallets, also with ferrule secured terminations, if requested.

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 packing 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 strengths 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.

No part of this catalogue (with the exception of the included fax form) may be reproduced and distributed by electronic or any other means without the prior written consent of DRAKO.

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

All data in our catalogues is subject to be changed by PFEIFER DRAKO in respect of technical development. Model and product claims cannot be asserted. All images, product information and dimensions as well as availability were correct at the time of printing.

Elevator Ropes

PFEIFER DRAKO

☐ **Inquiry** **inquiry@drako.de**
☐ **Order** **order@drako.de**

to

PFEIFER DRAKO
DRAHTSEILWERK GMBH & CO. KG

RHEINSTRASSE 19–23
D-45478 MUELHEIM AN DER RUHR
PHONE +49 (0)208-42901-0

Customer-No.	Date
Company	
Ordered by	
Phone	Fax
E-Mail	

Order/Inquiry-No.:
Required delivery time:

					Price Euro
Item 1	☐ **Traction drive ropes** ☐ **Hydraulic ropes**				
	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) ☐ swaged fitting with thread M _____ ☐ 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	**Packing** Suspension Rope ☐ delivery in coils ☐ delivery on wooden reel Governor Rope ☐ delivery in coils ☐ delivery on wooden reel				
Item 8	_____ pieces **wedge sockets** EN 13411-7 size _____				
Item 9	_____ pieces of **rope grips** EN 13411-5 size _____				
For ordering compensating ropes please use the order form ‘Compensation’ on page 43.					
Delivery address (if different from order address): Signature					

Notes:

Service

Fax +49 (0) 208-42901-43

Compensation

PFEIFER DRAKO

☐ **Inquiry** **inquiry@drako.de**
☐ **Order** **order@drako.de**

to

PFEIFER DRAKO
DRAHTSEILWERK GMBH & CO. KG

RHEINSTRASSE 19–23
D-45478 MUELHEIM AN DER RUHR
PHONE +49 (0)208-42901-0

Customer-No.	Date
Company	
Ordered by	
Phone	Fax
E-Mail	

Order/Inquiry-No.
Required delivery time

				Pieces	Length	Price Euro
Item 1	**Compensating Chain** (delivery always on wooden reels)					
	Type	Nom.-Ø in mm	Weight in kg/m			
Item 2	**Installation Kit**					
	Type					
Item 3	**Dampening Devices**					
	DR-L ☐	DR-H ☐				
Item 4	**Dismatling**					
	Type	Description	Length			
		1-side ☐	standard ☐			
		2-side ☐	300 mm* ☐			
			500 mm* ☐			
Item 5	**Special Compensating Ropes**					
	Type	Ø in mm	Weight in kg/m			
Item 6	**1. Rope end**					
	☐ plain end					
	☐ one end with ferrule secured thimble					
	☐ and eye bolt					
	M _____	☐ with spring and accessories				
		☐ with 1 PU-buffer and accessories				
		☐ with 2 PU-buffers and accessories				
		☐ with 3 PU-buffers and accessories				
		☐ without any				
	☐ rope termination type	_____ loose				
	☐ installation screw	M _____				
	☐ swaged fitting with thread	M _____				
Item 7	**2. Rope end**					
	☐ plain end					
	☐ rope termination	_____ loose				
Item 7	**Packing** ☐ delivery in coils ☐ delivery on wooden reel					
Item 9	_____ pieces of **rope grips** EN 13411-5 size _____					

Delivery address(if different from order address):	Signature

Comments

* not for WLC

Deliveries according to the Terms of Delivery and Payment of PFEIFER DRAKO DRAHTSEILWERK GmbH & Co. KG

Fax +49 (0) 208-42901-43

PFEIFER
DRAKO

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