Our mission is to empower you to take elevator design to new heights. With premium elevator ropes and tailored support, we facilitate the design process, streamline your supply chain and help reduce risk. Our experts are there every step of the way to make innovation easier, from strategic product development to global delivery, installation training to long-term customer service. Together, we can think bigger, aim higher and push the boundaries of what’s possible in lifting.

At Brugg Lifting, we help customers become leaders in lifting technology.

The sky is not the limit, it’s the goal.
Together, we can reach new heights.
As a Brugg Group company, we are part of a Swiss-based global group with more than a century of experience in rope and cable technology.

With three branch sites and six distribution companies in Europe, North America and Asia, Brugg Lifting is a partner in elevator development to customers worldwide.

Beating gravity for more than 120 years.

Brugg Lifting is a global manufacturer of elevator ropes, architectural ropes, wire ropes and lashing and lifting gear. But we’re not just a product supplier; we’re a partner in innovative elevator design.

Our global team supports your projects from start to finish to take the guesswork out of product development. With premium ropes, collaborative relationships and personalized support, we help strengthen your in-house expertise and capacity for innovation, empowering you to create safer, more modern elevators.

Together, we’re reaching new heights in elevator design so you can become a leader in the lifting industry.
Systems approach
We offer a wide range of elevator ropes, coated technologies, accessories and tools to meet your precise requirements. We can supply complete packages or individual parts depending on your project.

Continuous support
With multilingual experts around the world, we offer free installation training, on-site visits and troubleshooting to extend the lifespan of your elevators, improve system performance and prevent new issues from arising.

Customized solutions
Pushing the boundaries of lifting can mean creating something completely new. As a partner in innovative elevator design, we work with you to co-create custom products or services aligned with your overall strategy.

Project facilitation
We make product development easier by facilitating communication between different departments and locations. We’ll work with R&D, Engineering, Sales, etc. to ensure our solution fits your strategic needs.

Guaranteed safety
Our premium ropes are manufactured to the highest international standards for maximum reliability and quality, helping extend the lifespan of your elevators. We are certified to ISO9001:2018 and ISO 14001:2015 standards.

Availability and speed
With a global production and distribution network, we deliver what you need, when and where you need it. When time is critical, our express service provides materials immediately and ships them by courier around the world.

Partnership at every level
Our Elevator Ropes
Take your elevators to the next level with our premium rope technology

We help take the risk out of innovation with premium products that are trusted worldwide for their quality and performance. We start by sourcing raw materials exclusively from select suppliers that meet our high standards. Our modern production technologies and, above all, the skill and experience of our global teams ensure consistent quality, every time. We control our manufacturing processes and production lines with the latest measuring and monitoring techniques. Meanwhile, our in-house test facility allows us to continuously validate the quality of our products with fatigue tests and property analysis using statistical evaluation.

As system supplier, we have the corresponding end terminations, buffer systems and accessories for all elevator ropes in our product range.

Most items are available from inventory, allowing short delivery times and seamless logistics.

We specialize in the development and manufacture of threaded swaged end fittings and can also provide customized end terminations.
Elastic Elongation
Elastic elongation is the elongation that occurs when a rope is loaded. When the load is removed, the rope is restored to its initial state.

Example: With a DP9 rope, a load of 5% of the minimum breaking force results in an elastic elongation of ca. 0.091% of the length of the rope (with a length of 100 m, this is equivalent to 91 mm).

Elevator ropes from Brugg Lifting are especially characterized by a very low elastic elongation.

Permanent Elongation
Permanent elongation refers to the elongation at which a rope settles as a result of operation. This elongation is expected to occur at about 2% of the estimated rope service life.

The graph compares the permanent elongation of the different types of suspension ropes.

Elevator ropes from Brugg Lifting are especially characterized by a very low permanent elongation.

Minimum Breaking Load
MBL represents the minimum load that can be applied to a rope before it breaks.

The graphic compares the minimum breaking load of the different types of suspension ropes.

Reference: 100% = 8x19 suspension rope with natural fiber core.

Advantages of the i-LINE
- Simple and correct installation
- Safe installation aid
- Optimizes product performance
- Color-coded for the identification of the rope type

i-Line & Color Coding
Correctly installed hoist ropes increase the service life and safety of the elevator while improving riding comfort and reducing downtime.

Regardless of the construction or the producer, every hoist rope is susceptible to untwisting during the installation. With the help of the i-LINE, which is applied to Brugg Lifting hoist ropes during production, untwisted hoist ropes can be located, detected and corrected quickly and easily.
CTP®
Steel Core Rope with TPU coating
Separate Lay (IWRC)
6 Strands

For highest demands on elongation, riding comfort and service life

<table>
<thead>
<tr>
<th>Item number</th>
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<tbody>
<tr>
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*The defined lifting height is based on an elevator with a 1:1 suspension and is only indicative. It does not replace the exact calculation according to the system specifications.

Elastic elongation

Permanent elongation

Lifting height*

0.10 4%

0.130 4%

≤ 75 m

≤ 250 ft

A world first, CTP® unites technological innovation for the highest demands. This high-end rope is unbeatable in terms of function and efficiency.

Reduce your total cost by up to 40%.

A smaller rope diameter and a smaller drive allow for a reduction of capital and operating cost.

Reduce your maintenance cost by up to 100%.

CTP® is a self-contained system that eliminates the need for lubrication and minimizes maintenance.

Improve travel comfort.

The polymer coating eliminates or strongly absorbs vibrations, which significantly contributes to a smooth running.

Increase the service life.

As there is negligible wear between the traction sheave and the rope, the frequency of rope replacement is much reduced.

Certified by Liftinstituut B.V.
Amsterdam.

Tolerances according to ISO 2768-1 class m (middle). The CTP® rope is only certified for usage on traction and deflector sheaves that meet the requirements outlined above.

Specified Groove Diagram for CTP® 6.5 mm

Specified Groove Diagram for CTP® 8.1 mm

Certified and in Production. Available in Stock length and in cut lengths.

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Elastic elongation

Permanent elongation

Lifting height*
**ELEVATOR ROPES GENERAL CATALOGUE**

### HRS

**Full Steel Core Rope**

**Parallel Lay (PWRC)** - 9 Strands

- **For highest demands on breaking force, elongation and number of trips.**
- **Recommended for round grooves with an internal angle of ≤ 85°.**

<table>
<thead>
<tr>
<th>Item number</th>
<th>rop</th>
<th>Breaking load min.</th>
<th>weight</th>
<th>construction</th>
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<td>14,0</td>
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<td>11666</td>
<td>5/16</td>
<td>21,7</td>
<td>9,81</td>
<td>33,9</td>
</tr>
<tr>
<td>11668</td>
<td>3/4</td>
<td>98,1</td>
<td>69,9</td>
<td>138,9</td>
</tr>
<tr>
<td>11689</td>
<td>7/8</td>
<td>148,1</td>
<td>134,2</td>
<td>282,3</td>
</tr>
</tbody>
</table>

Further nominal strengths and/or diameters (including imperial dimensions) on request. Rope diameter-tolerances according to EN12385-5 / ISO 4344.

### SCX9

**Full Steel Core Rope**

**Separate Lay (PWRC)** - 9 Strands

- **For highest demands on breaking force, elongation and number of trips.**
- **Recommended for round grooves with an internal angle of ≤ 85°.**

<table>
<thead>
<tr>
<th>Item number</th>
<th>rop</th>
<th>Breaking load min.</th>
<th>weight</th>
<th>construction</th>
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<tbody>
<tr>
<td>10646</td>
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<td>58,5</td>
<td>14,0</td>
<td>82,1</td>
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<td>5/16</td>
<td>21,7</td>
<td>9,81</td>
<td>33,9</td>
</tr>
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<td>3/4</td>
<td>98,1</td>
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<td>148,1</td>
<td>134,2</td>
<td>282,3</td>
</tr>
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</table>

Further nominal strengths and/or diameters (including imperial dimensions) on request. Rope diameter-tolerances according to EN12385-5 / ISO 4344.

### MCX9

**Mixed Core Rope**

**Parallel Lay (PWRC)** - 9 Strands

- **For high demands on breaking force, elongation and number of trips.**
- **Recommended for round grooves and undercut round grooves.**

<table>
<thead>
<tr>
<th>Item number</th>
<th>rop</th>
<th>Breaking load min.</th>
<th>weight</th>
<th>construction</th>
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<td>10164</td>
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<td>21,7</td>
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<td>33,9</td>
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<td>10165</td>
<td>3/4</td>
<td>98,1</td>
<td>69,9</td>
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<td>10167</td>
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<td>148,1</td>
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<td>282,3</td>
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</tbody>
</table>

Further nominal strengths and/or diameters (including imperial dimensions) on request. Rope diameter-tolerances according to EN12385-5 / ISO 4344.

**HOIST ROPES**

- **Parallel Lay (PWRC)**
  - **HRS**
  - **Recommended for round grooves and undercut round grooves.**

- **DP9**
  - **Recommended for round grooves with an internal angle of ≤ 85°.**

- **MCX9**
  - **Recommended for round grooves with an internal angle of ≤ 85°.**

---

**Elastic elongation**

- DP9:
  - Elastic elongation ≤ 0.070%
  - Permanent elongation ≤ 0.200%
  - Lifting height* 52.52 ft

- MCX9:
  - Elastic elongation ≤ 0.083%
  - Permanent elongation ≤ 0.200%
  - Lifting height* 59.88 ft

---

* The defined lifting height is based on an elevator with a 1:1 suspension and is only indicative. It does not replace the exact calculation according to the system specifications.
### Fiber Core Rope

- **NFC (Sisal)**
- 8 Strands
- For high demands on elongation also under difficult installation conditions
- Recommended for all groove shapes

### Wire Rope with Polypropylene Core

- 8 Strands
- Suitable for small traction sheaves
- For high demands on small traction sheaves
- Suitable for conical grooves of ≥ 45°
- Recommended for conical grooves and undercut round grooves

### Compensation Ropes

- Used to balance the weight of hoist ropes and travelling cables in an elevator
- Elastic elongation
- Permanent elongation
- Lifting height*

### Tables

<table>
<thead>
<tr>
<th>Item number</th>
<th>Rope ø</th>
<th>Breaking load min.</th>
<th>Weight</th>
<th>Construction</th>
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<tbody>
<tr>
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<td>6857</td>
<td>8x19S -NFC 1370/1770 U sZ (RRL)</td>
</tr>
<tr>
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For high demands on elongation and corrosion protection with special rope lubrication

Elastic elongation
0.084%
Permanent elongation
0.22%

[EN 12385-2 formerly EN 10330]

A B C D E F G

Example

12 8 x19S-NFC 1370/1770 U sZ

Wire Rope with Polypropylene Core
6 Strands
Scale

Item number rope ø breaking load min. weight construction

61540 8.0 5/16 35.50 7981 20.97 0.1409 8x19S-SFC 1770 B sZ (RRL)

Further nominal strengths and/or diameters (including imperial dimensions) on request. Rope diameter-tolerances according to EN12385-5 / ISO 4344.

Wire Rope with Polypropylene Core
8 Strands
Scale

Item number rope ø breaking load min. weight construction

77513 9.5 3/8 50.30 11308 30.30 0.2036 8x19S-SFC 1770 B sZ (RRL)

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ELEVATOR ROPES - GENERAL CATALOGUE

ABBREVIATED DESIGNATIONS

A
- Rope nominal Diameter in mm
7 ( 7 x - 7 )
8 ( 8 x - 8 )
10 (10 x - 10)
B
- Wire core:
W wire core
WC wire core centre
IWRC independent wire rope core
C
- Construction:
Single layer rope with steel core (SC)
SCWC wire rope centre
IWRC independent wire rope core
- Single layer rope with fibre core (FC)
FCWC wire rope centre
IWRC independent wire rope core
- Single layer rope with fibre core (FC) in welded tubes (WT)
IWRC independent wire rope core
- Place with parallel lay:
FCF
- Type and Direction of Lay:
LS left-hand (left-hand lay)
LF left-hand (left-hand lay)

ELEVATOR ROPES - GENERAL CATALOGUE
APAG
Threaded Swaged Sockets [EN 13411-8]

Product Data
- APAG-end connections are TÜV tested and approved according to TRA / EN81.
- APAG-end connections transmits 80% of minimal breaking load of traction rope

Advantages
- simple, fast and safe end terminations
- shortened installation time, since no mounting of end connections by customers
- no special tools required
- the compact type enables a very tight arrangement of ropes and parallel running ropes
- simple securing against rotation
- position of pilot hole for rope end
- quiet operation because there are no individual parts

APAG (CTP®)
Threaded Swaged Sockets

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- the compact type enables a very tight arrangement of ropes and parallel running ropes
- simple securing against rotation
- position of pilot hole for rope end
- quiet operation because there are no individual parts
### Eyelet bolt with Swaged Thimble

**Product Data**
- Eyelet bolt steel St 37, zinc-plated

**Advantages**
- Simple, fast and safe end terminations
- No special tools required
- Simple securing against twisting

### Table

<table>
<thead>
<tr>
<th>Item number</th>
<th>ø</th>
<th>d₁</th>
<th>d₂</th>
<th>L₁</th>
<th>L₂</th>
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<td>800 kN</td>
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</table>

**Other sizes available upon request.**

### Door closing rope sets

**TSS - Rope Set**
- 1 FLEX door closing rope, 3500 mm length, with one-sided pressed APAG - external thread to adjust the correct rope tension
- 1 clamping ring to fasten a rope end at a fixed point
- 1 rope clamp and thimble to mount the loose rope end

One packaging unit contains 5 rope sets each.

**SMZ - Rope Set**
- 1 thread for easy installation DO-IT-LINE to adjust the correct rope tension
- 1 clamping ring to fasten a rope end at a fixed point
- 1 rope clamp and thimble to mount the loose rope end

One packaging unit contains 5 rope sets each.

The SMZ - rope set does not contain a door closing rope. This can be ordered separately.

### Advantages
- Fast and simple installation
- Suitable for most elevator door-closing systems
- Complete set – all parts are included
- Not much warehousing required

### Door closing rope sets

<table>
<thead>
<tr>
<th>Item number</th>
<th>ø</th>
<th>d₁</th>
<th>d₂</th>
<th>L₁</th>
<th>L₂</th>
<th>Breaking load</th>
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<tbody>
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<td></td>
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</table>

**SMZ**

<table>
<thead>
<tr>
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<th>d₂</th>
<th>L₁</th>
<th>L₂</th>
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<tr>
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</table>
Rope lock | Asymmetrical (EN 13411-6) with Eyelet (DIN 444)

**Product Data**
- Cast rope lock, galvanized steel
- incl. wedge, pre-assembled safety splints
- Rope lock transfers 80% of the minimum break force of the rope
- Threaded rod, galvanized steel
- In connection with the rope lock, the threaded rod transfers 80% of the minimum break force of the elevator rope
- The assembly and operation is subject to the requirements in Annex B/C of the EN 13411-6 standard

**Advantages**
- can be assembled safely and simply on-site
- springs, buffers and other accessories can be mounted individually

**Rope lock (CTP®) | Asymmetrical (similar to: EN 13411-6)**

**Product Data**
- Cast rope lock, galvanized steel
-incl. wedge, pre-assembled safety splints
-Rope lock transfers 80% of the minimum break force of the rope
-Threaded rod, galvanized steel
-Assembly and operation is subject to the requirements in Annex B/C of the EN 13411-6 standard

**Advantages**
- Can be assembled safely and simply on-site
- Springs, buffers and other accessories can be mounted individually

---

**Rope locks are only suitable for use with TRS ropes.**

### Rope socket (CTP®) |

**For use with CTP® 8.0 mm**

<table>
<thead>
<tr>
<th>Item number</th>
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<th>L₃</th>
<th>L₄</th>
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<td>320</td>
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<td>64303</td>
<td>D</td>
<td>7.0 - 8.0</td>
<td>16</td>
<td>180</td>
<td>320</td>
</tr>
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</table>

### Rope locks are only suitable for use with TRS ropes.

---

**For use with CTP® 6.5 mm**

<table>
<thead>
<tr>
<th>Item number</th>
<th>Type</th>
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<th>L₃</th>
<th>L₄</th>
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</thead>
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<td>180</td>
<td>320</td>
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<tr>
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<td>D</td>
<td>5.0 - 6.5</td>
<td>16</td>
<td>180</td>
<td>320</td>
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</tbody>
</table>

### Other sizes available upon request. You will find the item numbers for all combination possibilities in general rope catalogue.
**Door closing rope Flex**

- **Steel Core Rope 6 Strands Separate Lay**
  - Special design for door drives. Due to very fine strands especially suitable for deflector sheaves. Excellent service life with regard to high bending load.
  - **Advantages**
    - Can be assembled safely and simply on-site
    - Corresponds to the maximum rope diameter. For interim sizes of the rope diameter the next-largest clamp size is to be used.

<table>
<thead>
<tr>
<th>Item number</th>
<th>Rope Ø</th>
<th>Breaking load min.</th>
<th>Weight</th>
<th>Construction</th>
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<td>6x19S-WSC 1960 B sZ (RRL)</td>
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</tbody>
</table>

**Rope Clamp**

- **Elastomer buffers for Rope Attachment**
  - **Product Data**
    - Polyurethane elastomer with cells
    - Suitable for APAG, eyelet bolt, wedge socket symmetrical and asymmetrical
  - **Advantages**
    - Excellent buffering properties at minimal overall height
    - Transverse elongation
    - Also applicable on the counterweight side as rope length compensation
    - Grease- and oil-resistant

<table>
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<th>Item number</th>
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<th>d2</th>
<th>d3</th>
<th>L1</th>
<th>L2</th>
<th>max. stat. weight</th>
<th>max. pressure force</th>
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<td>420</td>
<td>11.772</td>
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</tr>
</tbody>
</table>

* With collar. If not expressly desired differently, we supply rope attachments with a buffer always with a collar. In case of several buffers always the top one with collar.

**Springs**

- **Steel spring, bright cylindrical type**
  - Suitable for APAG, eyelet bolt, wedge socket symmetrical and asymmetrical
  - **Advantages**
    - Improved riding comfort

<table>
<thead>
<tr>
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<th>For tread</th>
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<th>d2</th>
<th>d3</th>
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Note: For the calculation of the spring rate, the value of the spring rate of the cylindrical type is to be multiplied by the eccentricity factor.
### GDC - Groove Depth Comparator

The GDC enables you to precisely measure and compare sheave groove variations. It enables early detection of worn-out drive sheaves and may thus help to increase the service life of ropes.

**Advantages**
- Robust design in aluminum with anodized surface.
- Application in seconds. Weight of only 100g.
- Applicable for diameters from 8-22 mm or 3/8-3/4 inch.
- Precise finish.

### RWG - Rope Wear Gauge

Within seconds, the precision gauge enables you to check whether the minimum nominal diameter of the rope is below the target. If below limit, the rope must be replaced.

**Advantages**
- Robust design in aluminum with anodized surface.
- Application in seconds. Weight of only 100g.
- Applicable for diameters from 8-22 mm or 3/8-3/4 inch.
- Precise finish.

### Caliper

Wide flange calipers are specialized calipers designed to measure wire rope diameters. The flanges are wide so the contact span covers more than one strand to give an accurate measurement.

### Radius Gauge

A radius gauge allows the technician to quickly determine if the sheave groove is worn. Seat the radius gauge in the groove and direct a flashlight at it. If the light is blocked, the groove is worn. To get the exact depth of wear, use the GDC.

### VT-LUBE - Rope Care Lubricant

This rope care lubricant was especially developed for the relubrication of elevator ropes.

**Advantages**
- Excellent penetration quality causes optimum friction reduction in the rope.
- Excellent creep quality enables even lubricant distribution on and in the rope.
- Excellent corrosion protection suitable for high rope speed; through very good adhesive quality neutral quality towards synthetic materials (no swelling of plastic parts).

### Rope lubrication

The Simalube Smart Lubrication device automatically releases the flow of metered field lubricant that is guaranteed compatible with the grease applied in the wire rope factory. The lube flow rate is set with an allen wrench to meter the flow of the tube over a customized period of one to 12 months.

### Rope Cutters

The hydraulic rope cutters are designed to be used on cables up to 32mm in diameter.

### OUR ACCESSORIES

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<thead>
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<th>Unit of measurement</th>
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<td>Liter</td>
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<td>11240</td>
<td>52</td>
<td>Pieces</td>
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<tr>
<td>72329</td>
<td>5</td>
<td>Digital version</td>
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<th>Length</th>
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<td>500</td>
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<tr>
<td>07535</td>
<td>up to 16</td>
<td>2.3</td>
<td>600</td>
</tr>
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<table>
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<th>Unit of measurement</th>
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<tr>
<td>77749</td>
<td>3/8 - 13/16 in</td>
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<table>
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<th>Size</th>
<th>Unit of measurement</th>
</tr>
</thead>
<tbody>
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<td>Metric</td>
</tr>
<tr>
<td>10910</td>
<td>3/8 - 3/4 in</td>
<td>Imperial</td>
</tr>
</tbody>
</table>
Packaging

When selecting the packaging, Brugg Lifting chooses the best transport protection possible. Our ropes are protected during transport with special packaging materials against corrosion and mechanical damaging.

Whenever possible, our ropes are delivered on sturdy, reprocessable drums and reels that can be reused.

Cross Drums

capacity according to rope diameter from 100 m (ø 16 mm) to 400 m (ø 6,5 mm)

Round Reels *

ø / width: 300 - 600 mm / 320 - 530 mm

* Non-returnable packs from cardboard / wood

Coils

up to 50 m or 30 kg

XJ-Wooden Reels

ø 100 x 65 cm

capacity according to rope diameter from 1000 m HRS (ø 16 mm) or 1132 kg reel weight up to 4100 m HRS (ø 8 mm) or 1118 kg reel weight

System Deliveries on Pallets

consisting of rope / end terminations / accessories / mounting material

System Deliveries in Sturdy Cardboard Box

L / W / H: 80 x 60 x 80 cm / 120 x 60 x 80 cm

The RPM Rope performance measurement device makes it easier for you to check the rope tension during the installation, inspection and maintenance of elevators.

Advantages

· quick, easy and precise determination of rope diameter and tension
· comparison and measurement of rope tensions, e.g. within a rope set
· determination of the weight of ropes, counterweights, etc.
· easy documentation, query and comparison of the last 94 measuring results through storage in the device
· high precision of rope tension measurement of ± / - 1%
· and diameter measurement of ± / - 1%
· variable through battery-supplied operation (1 x 9 V battery)
· handy device: just 330 x 230 x 50 mm (12.9 x 9.1 x 2.0 in), weight only 2.6 kg (5.73 lb)

Keep the tension under control

Only the even tension within an elevator rope set can guarantee a wear- and maintenance-low operation and secure a high economic efficiency.

<table>
<thead>
<tr>
<th>item number</th>
<th>rope ø</th>
<th>number</th>
</tr>
</thead>
<tbody>
<tr>
<td>70020</td>
<td>8-22</td>
<td>5/16 - 7/8</td>
</tr>
</tbody>
</table>

RPM

Rope Performance Measurement Device

OUR ACCESSORIES

ELEVATOR ROPES GENERAL CATALOGUE

G5011000G 38

G5011000G 39
Together, we’re letting our imagination soar.
What is Permanent Elongation?

At the beginning of the service life, there is a settling effect that occurs in all suspension ropes when they are placed under load. As the wires and strands in the rope take up load, the outer layers of the rope constrict around the core. This results in the rope stretching and thus being permanently elongated.

The permanent stretch is a measure of this initial elongation of the rope (A). This is known as the running-in phase of the rope life. The smaller the permanent stretch, the less a rope must be shortened after the running-in phase. After the running-in phase, the rope length remains almost the same and only increases slightly (B). At the end of its service life, the ropes will suffer from wire abrasion, wire breaks and material fatigue, and the rope will again begin to stretch (C).

**Stretch during hoist rope life span**

The stretching behavior of elevator ropes contributes significantly to reliable and comfortable elevator operation, especially with increasing heights. In order to compare different ropes and to understand how they behave under different load conditions, reference values are required that describe this behavior.

For the assessment of the stretching behavior of ropes, we mainly use three characteristic values:

1. the permanent elongation,
2. the elastic elongation
3. the rope modulus (elastic modulus)

The elastic elongation and the rope modulus are mathematically linked and inversely correlated. I.e. a large elastic elongation means a low rope modulus.

What is Elastic Elongation?

The elastic stretch provides information about how much the rope stretches as a result of the current load. For example, the elastic stretch is a measure of how much the rope stretches for each extra kg loaded into the elevator car.

The smaller the elastic stretch, the better a rope is suitable for higher travel heights. A smaller elastic stretch means that movement when people boarding is better as well as improved ride comfort. Our values for the elastic elongation are based on a load with a force of 5% of the minimum breaking load (MBL), which normally corresponds to an elevator system with a half-full elevator car.

**Elastic Stretch Example**

In this case the elastic elongation would be 0.091%, see formula below:

\[
\text{Elastic Stretch} = \frac{91\text{MM}}{100 \times 1000\text{M}} = 0.091\% 
\]

**Rope Lifetime**

The different phases of a rope’s life are shown in the illustration:

- **Running-in phase** with permanent stretch
- **Main usage time**
- **End of service life**

**Example:**

Change in distance between empty and full car is the “elastic stretch”
What is Rope Modulus?
The rope modulus is a calculated value that relates the following inputs: Metallic area (A), force (F), & stretch (ε) which enables the conversion of any load (force in N) into an elastic stretch value (in mm) and thus plays an important role in the design of an elevator. The mathematical relationship is shown below.

\[ E = \frac{A \times F}{\varepsilon} \]

Because a rope is made up of many (100+) wires which move independently and interact in a non-linear way, the relationship between load and strain is not proportional. This can best be explained using a diagram.

As can be seen, the curve becomes steeper as the load increases. The rope module can be understood simply as a conversion factor between load and strain. Since the relationship between load and strain is not proportional, this conversion factor is not always the same. For example, at 1% minimum breaking load (MBL) a small increase in force results in more stretch than at 8% MBL.

How does Brugg Lifting measure these values?
Since elevator ropes are used between 2% and 8.3% of Minimum Breaking Load, we now state the values in the application-oriented load ranges 3%, 5%, and 7% of the breaking load.

This is made possible by a specially developed measuring method that simulates the rope’s running-in phase. After this phase we measure all three of the characteristic values described above in just one measurement.

For this purpose, a suspension rope is subjected to 50 cycles with increased load in order to simulate the setting of the rope. During the entire test, the strain behavior is recorded using a laser strain gauge and then each of the 50 cycles is evaluated automatically. The rope module value at the respective load levels (3%, 5% and 7%) is calculated as the average of the last 15 cycles. The permanent elongation is captured at the last cycle.

Technical specifications
Below you will find guide values for our products.

<table>
<thead>
<tr>
<th>Load as % of MBL</th>
<th>Permanent elongation [%]</th>
<th>Elastic elongation with 5% MBL [%]</th>
<th>Rope modulus with 3% MBL [N/mm²]</th>
<th>Rope modulus with 5% MBL [N/mm²]</th>
<th>Rope modulus with 7% MBL [N/mm²]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1%</td>
<td>0.090</td>
<td>0.070</td>
<td>87 000</td>
<td>95 000</td>
<td>103 000</td>
</tr>
<tr>
<td>3%</td>
<td>0.200</td>
<td>0.091</td>
<td>64 000</td>
<td>71 000</td>
<td>78 000</td>
</tr>
<tr>
<td>5%</td>
<td>0.100</td>
<td>0.083</td>
<td>74 000</td>
<td>81 000</td>
<td>87 000</td>
</tr>
<tr>
<td>7%</td>
<td>0.200</td>
<td>0.101</td>
<td>63 000</td>
<td>69 000</td>
<td>75 000</td>
</tr>
</tbody>
</table>

This chart shows the typical behavior of the permanent elongation and the rope modulus during a test of a DP9 elevator rope.

**Test results of a DP9 Traction Rope**

The specified values, in particular the rope modulus, are to be understood as general guide values for a rope type and should serve as orientation points. The actual values of a specific rope are always dependent on the rope diameter and manufacturing-related factors. The content of this table is therefore nothing more than a specification of the ropes. We will be happy to help you with any questions about the technical information.
1. Discard criteria of the CTP® rope

Brugg Lifting applies a simple replacement criteria that limits the use of the CTP® rope to a defined number of rides. This method of appraisal is therefore based on the level of usage. This discard criteria forms part of all CTP® rope certifications, which have been issued by LIFTINSTITUUT. The calculation of maximum allowed trips is described under chapter “conditions” as follows:

- The defined maximum number of bending cycles is divided by the number of pulleys that are passed most often by the bended rope.

During inspection the condition of the ropes should always be checked for any abnormal wear or damage. The table on page 51 shows the five typical rope issues which can occur in an elevator system and the according actions, which must be taken by the elevator maintenance company in such a case.

2. Elevator specifications

Only with the help of specific elevator data are we able to analyze the rope regarding traction capabilities, bending fatigue performance, etc. Therefore in case of support please contact your Brugg Lifting representative.

3. Visual inspection

External factors that could have a negative impact on the rope should be evaluated. Before doing detailed measurements we recommend to first visually check the outside appearance of the rope. Particular attention must be paid to the rope coating:

- Broken wires piercing out of the coating material
- Irregularities regarding rope coating surface (bumps, dents, or similar)
- Scratches, tear or fractures on the rope coating
- Abrasion of the coating
- Breakout of the rope
- Dust, oil, water, etc. on the rope coating
- Rope kinks

The following points should also be evaluated:

- Rope touching elevator parts or shaft
- Ropes touching each other due to electro-static charge
- Insufficient alignment of traction sheave and/or diverting pulley

Whenever possible, pictures of the rope should be taken during inspection (also in the case of intact ropes). Also traction sheave, diverting pulley and end terminations should be photographed.

4. Inspection of fleet angle

The allowable fleet angle is 0.5°. For the CTP® 8.1, this angle can be increased up to a maximum of 1.0° as long as the number of trips is reduced/limited to 2,400,000 and the number of pulleys passing the most bended part of the rope is not greater than 10. However, for the CTP® 6.5 this does not apply.

Fleet angle allowed (in accordance with our certificate) is 0.5°. If the fleet angle is too big it will induce torsion into the rope. This effect also applies to conventional ropes but is even more pronounced in the CTP® rope.

The most critical positions are when the cabin is at the top floor (maximum fleet angle between cabin and traction sheave/deflecting pulley) and when the cabin is at the lowest floor (maximum fleet angle between counter weight and traction sheave/deflecting pulley). It is fairly difficult to directly measure the fleet angle between rope and sheave. For this reason we recommend an indirect more practical way of measuring the fleet angle (please see below).

To get a rough estimate on the fleet angle measure following points (illustrated on an elevator with 1:1 suspension):

1. Distance from traction sheave to end termination on lift car (when cabin is at the top floor)
2. Distance from rope to rope at rope termination on elevator cabin and on traction sheave. Distance from rope to rope on traction sheave (groove to groove distance) and on rope termination on counter weight
3. Distance from traction sheave to end termination on lift car (when cabin is at the very top)
4. Distance from rope to rope at rope termination on elevator cabin and on traction sheave. Distance from rope to rope on traction sheave (groove to groove distance) and on rope termination on counter weight
5. Distance from traction sheave to end termination on counter weight (when cabin is at the very bottom)
5. Inspection of groove shape
(Fraction sheave and diverting pulley)

Even if traction sheave and diverting pulleys are manufactured according to drawing (radius for CTP 6.5: 3.4 – 3.65 mm, radius for CTP 8.1: 4.3 mm), we strongly recommend to check the groove shape with the specially designed Brugg groove gauge. Brugg lifting provides a custom made gauge which includes the 45° (30° – 45°) opening angle as specified in our CTP certificates.

Furthermore check the groove surface for following defects:

- Rust or abrasion of rope coating on or around sheave
- Wet surface (water, oil, etc.)

Finally, check if the bearings of the diverting pulleys still run smoothly, if possible.

6. Rope tension

Even though rope tension is often measured by hand (by plucking the rope and judging by “feeling”) this method is far from accurate. Comparing spring buffers with each other is more precise — to a certain extent. But all elevators are not equipped with this kind of equipment.

Therefore, measuring rope tension is by measuring the tension on the rope itself. There are various tools for measuring tension commercially available. Brugg lifting recommends our own specialist tool the Brugg RPM.

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**Safety Instructions**

Most of these inspections must be performed on a running elevator (in maintenance mode).

Never perform below listed measurements without a trained authorized elevator personnel.

Be sure to be secured at all times while standing on top of the lift.

CTP ropes should not be operated in oil or water on the surface of the rope. If water or oil is on the surface of the rope and then comes into contact with the traction sheave, it will reduce traction capability and cause slippage.
We’re transforming elevator design to push the boundaries of what’s possible in lifting.

Lifting doesn’t have to be boring.

Lift yourself up with our Brugg playlist on Spotify!

https://spoti.fi/2Syv7Us
No matter where, we are there

Our quality products are available from more than 20 distributing partners around the world. All contacts on brugglifting.com