

## The LEITNER Line







## The **LEITNER Line**

Safety all along the line

The line profile is that part of a ropeway which is most affected by topographical conditions. It is therefore important to develop a highly adaptable product, which ensures that the potential of an installation is not limited by the shape of the territory but by the relevant regulations.

For the passenger, the line has to provide the highest level of ride comfort and safety. For the operator, the line has to ensure maximum reliability, highest availability and, last but not least, low maintenance requirements of the applied parts.

For decades, LEITNER has been meeting these challenges and has been setting standards with cutting-edge solutions such as the rotation limitation for roller batteries.

All components of the LEITNER line, including standard tubular towers, roller batteries, maintenance platforms and tower equipment, such as yokes and hoisting beams, are designed, certified, manufactured, installed and operated by LEITNER according to the latest CEN regulations which are valid throughout Europe.

All LEITNER towers are equipped with ladders, safety cables, large maintenance platforms and hoisting beams. High towers have additional maintenance platforms.



## The **LEITNER** Towers

Customised engineering, optimum line profile

**Basis** The basic principles of LEITNER tower systems are maximum variability and adaptability combined with optimum safety and quick implementation.

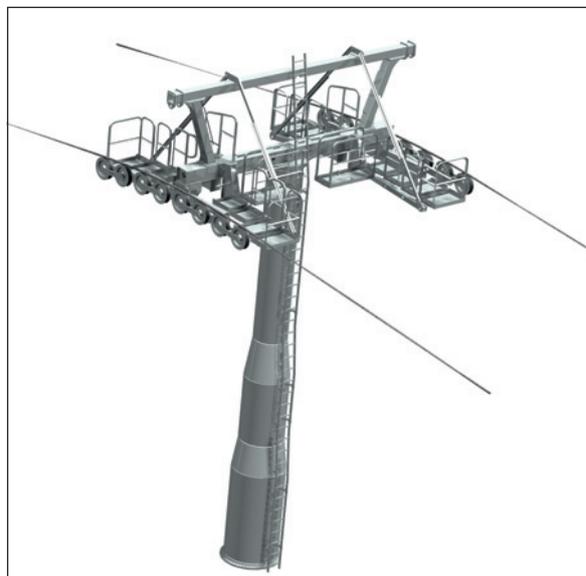
**Description** The LEITNER tower is designed as a central tubular tower. The individual towers consist of a combination of steel pipes of different lengths, diameters and wall thicknesses.

The transition between the diameters is implemented with appropriate conus elements. The individual pipe and conus elements are connected by welding.

Depending on its weight and length, the tower is divided into separate shafts, which are assembled on the construction site with appropriate flange connections.

All components of the LEITNER tower are hot-dip galvanised and therefore provide life-long protection against corrosion. If prescribed by regulations, the tower shafts can also be lacquered with RAL colours.

In addition to the engineering of the towers, LEITNER also takes over the development of the tower foundations – from the design to the technical drawings.



**Benefits** Each tower of a LEITNER line is **engineered, designed and manufactured** according to the **specific topographical and mechanical requirements** of a project. The combination of the different pipe diameters and wall thicknesses as well as the separation of the tower into individual shafts can be modified as requested.

As the tower height is **manufactured with centimetre accuracy**, customers are provided with the **highest level of flexibility**. At the same time, the **best line profile** regarding the topographical conditions can always be achieved without having to adapt the excess length of the foundation.

The use of standard pipes ensures **rapid manufacturing and replacement**.

## Technical data

Max. tower height	30 m
Max. length of shaft	Depending on transport and assembly conditions, standard length: approx. 12 m
Max. weight of shaft	Depending on transport and assembly conditions, standard weight: approx. 3,000 kg
Line gauge	3.9 m/4.9 m/5.3 m/6.1 m/6.6 m/7.3 m
Pipe diameter	609 mm/762 mm/1016 mm/1220 mm/1422 mm/1910 mm (special diameter)
Wall thickness	From 8 to 16 mm
Surface finishing	Hot-dip galvanising, additional lacquering with RAL colours on request



## The LEITNER Special Towers

Reaching higher levels with standard components

**Basis** Towers with heights of over 30 m are constructed by LEITNER as special central towers, two-leg, four-leg or lattice towers. The upper shaft of all types can be designed as a Y-piece.

**Description** Below the upper tower shaft, the two-leg/four-leg tower is separated into two pipes by an intermediate section. Depending on static requirements and the height of the tower, a two-leg construction can be expanded to a four-leg construction by adding further intermediate sections. Except for the intermediate section, the only components used for this purpose are standard tubular tower components (pipes, conus elements, flange connections). The individual elements are always separated in a way that ensures trouble-free transport and assembly.

In order to divide the Y-tower into 2 tower heads, a so-called Y-piece is attached onto the upper tower shaft. The head piece of the Y-tower also consists of standard tubular tower components. Optionally, the special central tower can be equipped with a ladder inside the tower shaft.

The upper component of the lattice tower is identical with the standard tubular tower. It is connected to the lower lattice construction by means of a flange connection.

The surface finishing of all towers is realised by hot-dip galvanising and/or additional lacquering with RAL colours on request.



**Benefits** The **combination** of the different pipe diameters, wall thicknesses as well as separations can be **modified as requested** and **perfectly adapted** to the statical requirements of the special tower.

The **use of the standard components** of tubular towers **ensures rapid manufacturing** and **short restocking times**. A special tower can therefore be **installed** almost **as fast as a standard** tubular tower.

Although it needs only a **small base area**, the **special central tower with Y-head** allows for **great tower heights** and is therefore ideally suited for **urban use**.

## Technical data

Max. tower height	approx. 65 m (two-leg/four-leg and special central tower), and higher (lattice tower)
Max. length of shafts (tubular)	depending on transport and assembly conditions, standard length: approx. 12 m
Max. weight of shafts (tubular)	depending on transport and assembly conditions, standard weight: approx. 3,000 kg
Line gauge	3.9 m/4.9 m/5.3 m/6.1 m/6.6 m/7.3 m
Pipe diameter	609 mm/762 mm/1016 mm/1220 mm/1422 mm/1910 mm/3500 mm, conical shaft according to statical requirements
Wall thickness	from 6 to 25 mm, variable with conical shaft according to statical requirements



## The LEITNER Roller Batteries

Safe design – trendsetting for many years

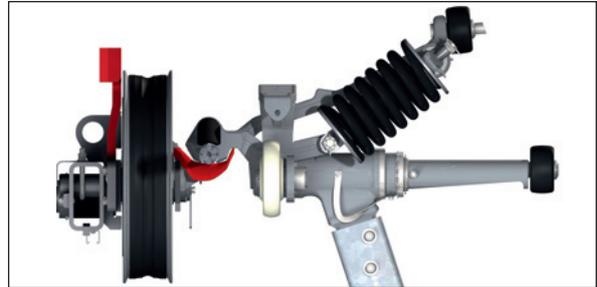
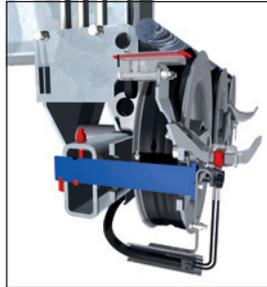
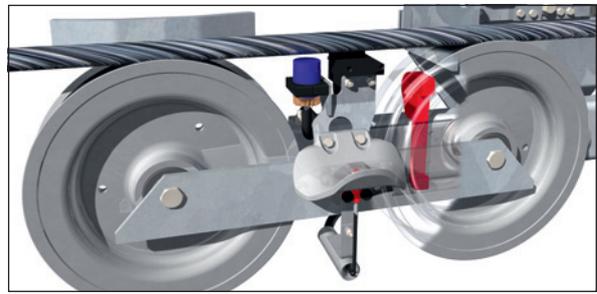
**Basis** Safety allows no compromises. For many years, LEITNER roller batteries have therefore offered outstanding safety characteristics – long before these characteristics became mandatory through the amendment of the European safety requirements in 2004.

**Description** The outer flange and main body of the LEITNER rollers are integrated into one aluminium cast, which virtually eliminates a total loss of the flange. The lining of the roller is a one-piece rubber ring whose mixture leads to minimal flexing, thus reducing the rope's friction loss on the roller to a minimum and also eliminating the cracking and loss of the rubber ring.

The extension of the flange beyond the roller lining and the depth of the groove are perfectly matched to the LEITNER grips and therefore guarantee maximum deropement protection. While the cable catchers on the outside of the battery are designed to allow the passage of derailed grips, the deropement protection devices on the inside of the battery prevent the rope from slipping onto the inner side.

Since 1993, LEITNER roller batteries have been equipped with a so-called rotation limitation, which ensures the crossing of grips even after loss or derailment of the rope.

Together with the numerous brake forks, the design of the last rocker of each battery allows for reliable deropement detection even if the cable catchers have been missed.



**Benefits** **High flange extension** beyond the roller lining and **maximum groove depth** guarantee the highest level of **deropement protection**.

The biaxial setting of the roller batteries ensures their **optimal integration into the axis of the rope**.

Thanks to the high roller pressure of the LEITNER roller batteries, the **number of rollers can be reduced**, which consequently **saves maintenance and spare parts costs**.

The rubber mixture of the LEITNER rollers results in **minimal flexing** and therefore in a considerable **reduction** of the required **drive power** of the installation.

## Technical data

Roller diameter	Compression roller battery: Ø 420 mm Supporting roller battery: Ø 420 mm, Ø 460 mm, Ø 550 mm Mixed roller battery: Ø 420/420 mm and Ø 420/550 mm
Number of rollers	Compression roller battery: 8, 10 and 12 rollers Supporting roller battery: 4, 6, 8, 10 and 12 rollers Mixed roller battery: +/- 4 rollers and +/- 8 rollers
Max. roller pressure	Compression roller battery: 6 kN Supporting roller battery: 10 kN
Monitoring devices	Standard: brake forks for deropement detection and wire cut detector Optional: CPS (Cable Position Supervision)



## The **LEITNER CPS**

Maximum safety and availability

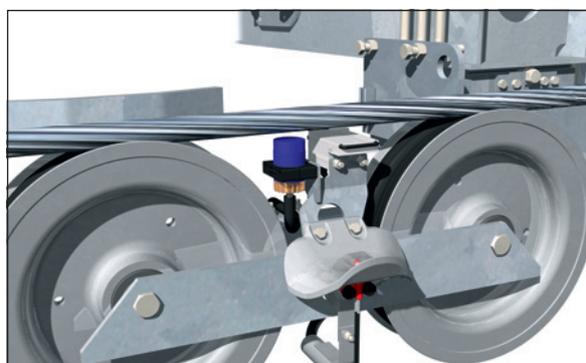
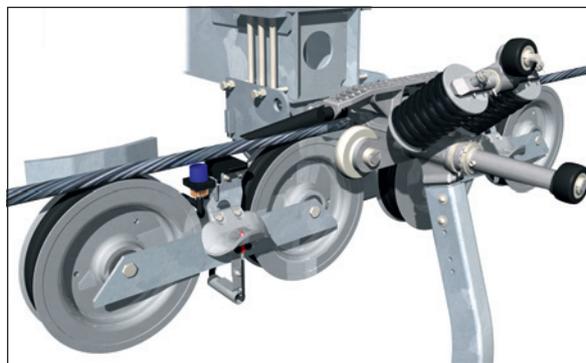
**Basis** The new CPS (Cable Position Supervision) system is the advancement of a proven proximity switch for the monitoring of the cable position, which LEITNER has applied in North America for many years.

**Description** The CPS consists of a central evaluation unit in the drive station and inductive-type proximity switches on the towers. For each roller battery, only two sensors are applied. These are installed at the first and last rocker of each roller battery.

When the sensors detect an incorrect position of the cable, they send a signal to the evaluation unit. Consequently, the main control immediately initiates the appropriate safety measure (slowing down or stop), depending on the state of the cable.

The evaluation unit and the proximity switches are connected via a state-of-the-art safety bus system. Stop buttons on the towers and the brake forks can also be connected to the bus system. The voltage supply on the towers is provided via an additional supply cable.

The CPS can also be applied to compression towers. The full scope of the monitoring functions can be achieved by installing additional pressure rollers.



**Benefits** With regard to the cable position, the LEITNER CPS ensures the **highest level of safety and availability** of the installation. As soon as the cable leaves the groove of the roller, it is reliably corrected with the help of the CPS.

The application of the safety bus system requires **minimal wiring**. Moreover, the safety bus system detects malfunctions of all individual sensors, allows a **selective bypass** of all sensors and therefore **reduces the required replacement measures** to a minimum.

## Technical data

Voltage supply	230V AC for central evaluation unit 120V DC for tower equipment
Signal transfer	Safety bus/diagnosis bus
Monitoring functions	Cable out of position (level 1) countermeasure: slowing down Cable out of position (level 2) countermeasure: stop Cable too close to sensor countermeasure: stop
Requirement class	AK4 (fail-safe) – for monitoring of level 2 AK2 – for monitoring of level 1 and “cable too close to sensor”

