SE 110.50
Cable under dead-weight

The illustration shows SE 110.50 in the frame SE 112

Description

- **catenary of a free-hanging cable under dead-weight**

Free-hanging cables and ropes are often used to support a structure, such as stay cables. On suspension bridges they are the load-bearing element of the structure. In many calculations the influence of the dead-weight of the cable can be ignored, because it is low compared to the other loads. In the case of overhead power lines, however, the dead-weight of the cable is relevant to the design of the pylons.

In SE 110.50 a free-hanging cable under the influence of its own dead-weight is investigated. A roller chain serves as the cable, and is mounted on two ball bearing-supported chain wheels. The chain wheel units are fixed to a cross-arm. The spacing between the chain wheel axles can be adjusted horizontally and vertically. Weights can be attached to both ends of the chain. The maximum sag is measured using scaled rules, and can be compared with calculated values. The sag is the distance between the connecting line of the supports and the catenary (see also illustration: “Actual applied cable forces” on the next page).

All the component elements of the experiment are clearly laid-out and housed securely in a storage system. The complete experimental setup is arranged in the frame SE 112.

Learning objectives/experiments

- determination of the catenary of a free-hanging cable
  - under dead-weight only
  - with additional weights
  - with a symmetrical setup (chain wheels at same height)
  - with an unsymmetrical setup
- measurement of the sag
- comparison of calculated and measured values

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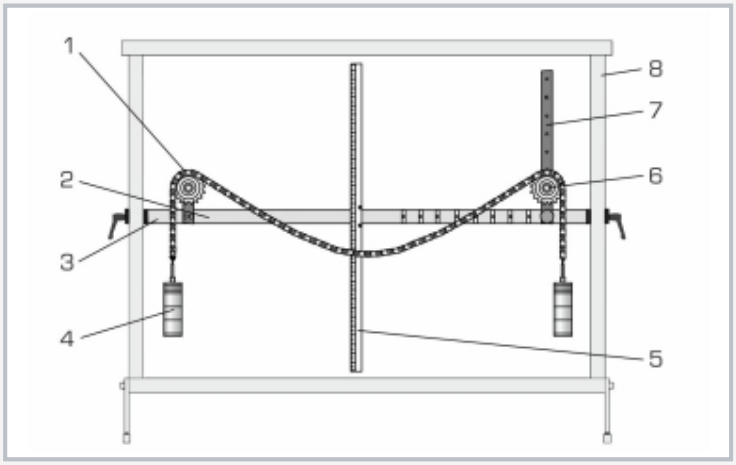
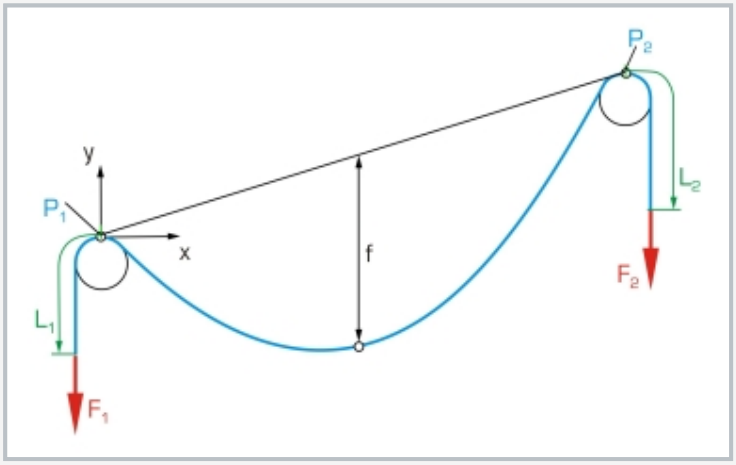


1 roller chain, 2 cross-arm with scale, 3 clamp, 4 weight, 5 rule, 6 chain wheel, 7 chain wheel holder, 8 frame SE 112



Actual applied cable forces: F_1 + F_2 forces, L_1 + L_2 suspended chain length with dead-weight, P_1 + P_2 marker point on chain wheel, f sag

Free-hanging cables in practice (portal): 1 stay cable, 2 power line, similar to overhead line

Specification

[1] determination of the catenary of a free-hanging cable
[2] symmetrical and unsymmetrical experimental setup possible
[3] roller chain as cable with 2 ball bearing-mounted chain wheels
[4] adjustable chain wheel axle spacing
[5] height of a chain wheel adjustable for unsymmetrical experimental setup
[6] cross-arm with scale to hold chain wheels and rule to measure vertical sag of chain
[7] 2 hangers to load the ends of the chain
[8] storage system to house the components
[9] experimental setup in frame SE 112

Technical data

Roller chain
- DIN 8187
- length: 2400mm
- weight: 0,95kg/m

Chain wheel, number of teeth: 17

Cross-arm
- axle base: 600...1000mm
- groove spacing: 50mm

Holder
- adjustable height of chain wheel: 0...300mm
- hole spacing: 50mm

Weights
- 2x 1N (hanger)
- 8x 1N
- 6x 5N

Measuring ranges
- horizontal: 0...1000mm
- vertical: 0...850mm
- graduation: 1mm

LxWxH: 1170x480x178mm (storage system)
Weight: approx. 29kg (total)

Required for operation

Mounting frame SE 112

Scope of delivery

1 roller chain
1 cross-arm with clamp
2 chain wheels with holders
1 rule
1 set of weights
1 storage system with foam inlay
1 set of instructional material

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Required accessories

022.11200	SE 112	Mounting frame