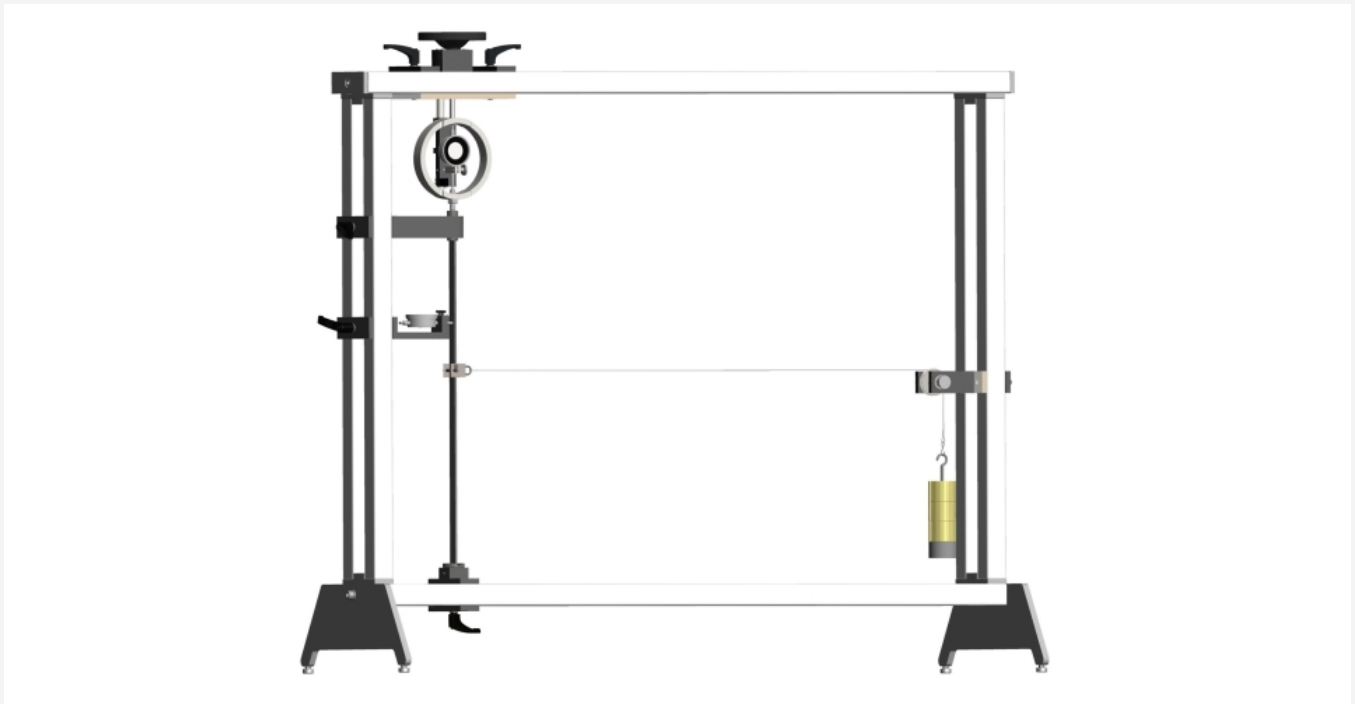


SE 110.57

Buckling of bars



The illustration shows SE 110.57 in the SE 112 mounting frame

Description

- **demonstration of buckling in bars**
- **test bars made of different materials and for different support types**
- **experiments with eccentric application of force and shear forces**

Long and slim components such as bars, beams and columns are often subjected to compressive forces along their long axis owing to their function. Under the influence of critical compressive forces, such components can lose stability and deform laterally. The technical term for this loss of stability, which occurs suddenly or continuously, is buckling. In this case, it is not the material that fails but the component shape. The stresses in the bar are often still in the elastic region.

The SE 110.57 unit can be used to clearly demonstrate the elastic buckling of bars under various influences. In this experiment, a bar is clamped or supported at both ends, depending on the buckling case. A load mechanism applies a compressive force to the bar. The applied force is measured and displayed on a force gauge. A dial gauge indicates the lateral deflection of the bar.

This experiment also demonstrates that other factors affect the buckling behaviour, such as the material and the cross-sections. Another experiment shows the influence of additional shear forces. In this experiment, a shear force is applied to the joint in the buckling bar through a cable and a weight.

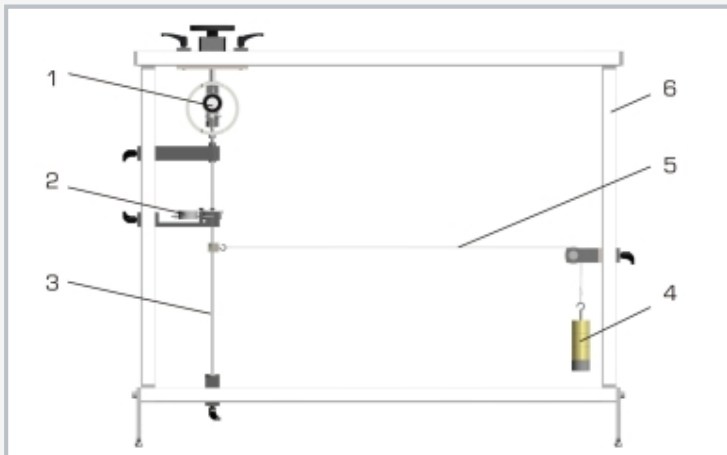
The parts of the experiment are clearly laid out and securely housed in a storage system. The entire experimental setup is constructed in the SE 112 mounting frame.

Learning objectives/experiments

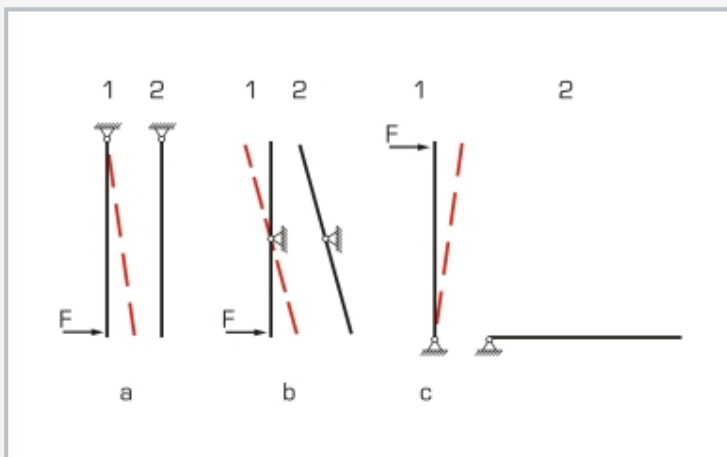
- investigation of buckling behaviour under the influence of
 - ▶ different supports, clamps
 - ▶ different cross-sections
 - ▶ different materials
 - ▶ additional shear forces
- testing Euler's theory: buckling on elastic bars
- measure force and displacement
- calculate the expected buckling force with Euler's buckling formula
- graphical analysis of the deflection and the force

SE 110.57

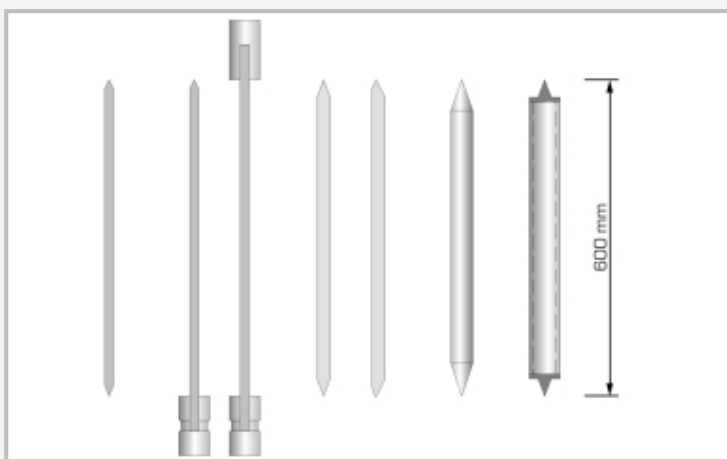
Buckling of bars



1 load mechanism, 2 dial gauges for lateral deflection of the sample bar, 3 test bar, 4 weight, 5 cable, 6 SE 112 mounting frame



Various equilibrium positions: a stable, b indifferent, c unstable; position 1 deflection of the bar due to load, position 2 bar after load is removed



Test bars made of different materials and for different support types

Specification

- [1] clear demonstration of elastic buckling
- [2] load mechanism for applying forces
- [3] test bars pinned or fixed
- [4] devices for generating shear forces with staggered weights
- [5] measurement of lateral deflection with a dial gauge
- [6] test bars of different materials: steel and aluminium
- [7] storage system for parts
- [8] experiment setup in the SE 112 mounting frame

Technical data

Test bars

- 3x steel, LxWxH: 600x20x4mm
- 2x aluminium, LxWxH: 600x25x6mm
- 1x aluminium, LxØ: 600x10mm
- 1x aluminium, LxWxH: 600x15x2mm

Weights

- 1x 5N (hanger)
- 3x 5N

Measuring ranges

- force: 2...5kN
- travel: 0...10mm, graduation: 0,01mm

LxWxH: 1170x480x178mm (storage system)

Weight: approx. 30kg (total)

Required for operation

Mounting frame SE 112

Scope of delivery

- 1 load mechanism
- 1 set of test bars
- 1 support
- 2 dial gauges
- 1 cable
- 1 pulley
- 1 set of weights
- 1 storage system with foam inlay
- 1 set of instructional material

SE 110.57

Buckling of bars

Required accessories

SE 112 Mounting frame