Basic

... rostfreie Drahtseile und Endverbindungen mit den unendlichen Kombinationsmöglichkeiten.

... câbles et éléments inox pour une gamme d'utilisations illimitées.

... stainless steel wire rope products and connectors for an unlimited range of applications.

... funi di acciaio inossidabile e terminali che consentono un'innumerevole varietà di combinazioni.

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Per qualsiasi informazione, vogliate rivolgersi a:

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www.jakob.ch, eMail: inox@jakob.ch
Green façades for a pleasant atmosphere.

Facade greening, so far usually left to chance,
has gained a new dimension: Jakob® INOX LINE.

Attractive training systems for microgardens
can be built with a few easy-to-assemble com-
ponents made of high-grade stainless steel.

The days of haunted castles are over:

Green façades are appealing, ecologically
sensible and useful. The latest insights on
climbing plants combined with tastefully
designed and technically sophisticated train-
ing systems open a treasure chest of greening
variations and styles. Greening makes sense
from a construction physics point of view and
has many ecological benefits. The future is
indeed green: it will be shaped by the creative
collaboration of innovation-driven architects
with greening specialists.
INTERIOR TEMPERATURE REGULATION
The familiar pergola of southern countries is an ancient but highly efficient method of interior temperature regulation. It promotes the formation of an insulating layer of air, thereby preventing an excessive increase of the inside temperature due to direct solar irradiation. This principle also offers several advantages when applied to vertical structures: the insulating cushion of air between vegetation and façade evens out temperature fluctuations and noticeably reduces heating and air-conditioning costs.

FAÇADE PROTECTION AND VENTILATION
A well-designed covering of vegetation is a natural shield against lashing rain or ultraviolet radiation. In addition, the space between the façade and the greenery has a temperature-regulating effect and promotes optimum ventilation as well.

THE AESTHETICS OF GREENING
The integration of greased surfaces into contemporary architecture presents novel design opportunities. Planners and architects who have teamed up with greening specialists are already producing outstanding results and are defining new dimensions for "art on buildings."

REVALUATION OF EXISTING STRUCTURES
Without any risk whatsoever, professionally conceived façade-greening schemes can aesthetically upgrade bleak storage buildings or non-descript concrete apartment blocks. Beneficial side effects include natural air-conditioning, reduction in energy costs and an extension of the useful life of the structure.

COMPLEMENTARY GREENED SURFACES IN URBAN ENVIRONMENTS
A large number of buildings in conurbations offer locations where plants can be grown. Ever-increasing land prices necessitate the erection of high-rise structures. The subminiature gardens on housing estates or balconies benefit materially – the greening of buildings is economical, ecologically favourable and, at the same time, enhances the quality of life.
Characteristics and requirements of climbers

The natural habitats of the climbing plants are for the most part in woodland and forests, clearings and peripheral zones. Supported by other plants, they work their way upwards to the light (several species thrive and support themselves on rocks). The climbing plants have developed a variety of climbing patterns (A to F).

Growing conditions as near as possible to those in natural habitats must be provided to ensure the successful covering of façades - moist, humus-rich and loose-packed soil together with a support structure appropriate to any of the climbing patterns. Generally speaking, good supplies of water and nutrients are important. An additional water supply may be imperative to ensure healthy growth.

The correct training system must be selected for each specific climber.

With regard to optimising the planting location, there can be divergences from the typical bionomic habitat such as a shady root run and sunlight for the top of the plant.

- Wisteria, trumpet vine (Campsis) as well as several Clematis varieties require unobstructed sunlight to encourage free flowering.
- Ilex (Hedera), many honeysuckle (Lonicera) and Clematis varieties do best in lightly shaded locations.
Adhesive-sucker climbers support themselves with short lateral shoots tipped with glandular discs that adhere to any surface, even those that are quite smooth. Although these plants require no auxiliary means of support, they can cause damage to buildings.

- Boston ivy (Parthenocissus tricuspidata)

Vines twine around their supports as a result of the circular movement of their stem tips (circumnutation). Only a single vertical support (wire rope) is required.

- Watercress (Lonicera)
- Staff tree (Celastrus)
- Hops (Humulus)
- Morning glory (Ipomoea)

Leaf-stem climbers form coils around their supports with their leaf stems. Grid-like or reticular structures provide the best supports.

- Clematis (most varieties)
- Nasturtiums (Tropaeolum)

Leaf climbers develop clinging, often beautiful structures that respond to external stimuli. Grid-like or reticular structures provide optimum supports.

- Grape vines (Vitis)
- Ampelopsis
- Passion flowers (Passiflora)
- Cucumber

Scrambling plants work their way up by using epidermal outgrowths such as prickles, hook-like thorns and bristles.

- Climbing and rambling roses
- Bramble-like shrubs (Rubus)
- Winter-flowering jasmine

Plants with different climbing patterns can be combined perfectly well. The plants themselves as well as the configurational and aesthetic aspects determine the choice of the climbing supports. Any desired configuration can be created with the Jakob® INOX LINE. Qualified greening specialists should be consulted when the plants are chosen.

Structural damage and insects.

Climbing plants do not bore holes or cause cracks in the masonry. This is why most of them are harmless. Nevertheless, exceptions and potential hazards should not be disregarded.

Certain climbers (e.g. the ivies) can grow into joints and cracks, widening them, and thereby causing permanent damage. Collaboration with greening specialists helps to avoid such risks and to optimize the many benefits that result from greening a building.

Greened façades replace the natural greenery that has become rare in urban environments and, at the same time, offer a new biosphere for animal life. Insects are more likely to be beneficial than harmful. They are essential for the pollination of numerous cultivated plants and also act as public health officers while serving as a basic food supply for other creatures. Regular inspections and trimming where it is necessary help to prevent damage and an invasion by unwelcome guests.

DIMENSIONS

- The ideal height and width of the climber supports
- Distances from wall
- Wire rope spacing for vines
- Lattice size
- Wire rope or rod diameters

depend on the vigour, size and climbing pattern of the desired climber as well as on the architecture of the structure and the aesthetics of the greening concept.

DISTANCES FROM WALL

for slow-growing to moderately vigorous climbers (e.g. Clematis, Lonicera)

approx. 80

for very vigorous climbers (e.g. Watercress, Celastrus, Fallopia)

approx. 150

PLANTS

- Vines (Twinng Plants)
- Leaf-stem climbers
- Leaf climbers
- Scrambling plants

ROPE SPACING FOR VINES

for slow-growing to moderately vigorous climbers (e.g. Lonicera)

approx. 200 – 400

for very vigorous climbers (e.g. Watercress)

approx. 400 – 800

LATTICE SIZES

for slow-growing to moderately vigorous climbers (e.g. Clematis)

approx. 150 x 250

for very vigorous climbers (e.g. Vitis)

approx. 300 x 500

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BUILDING GREENING IN THE WORLD’S VEGETATION AND CLIMATE ZONES

The greening of buildings meets all the requirements for consideration as an important element in contemporary housing-estate planning.

Main advantage
Occupies very little ground space but nevertheless has many uses.

Example: energy saving
Large amounts of energy and considerable sums of money can be saved by greening buildings with climbing plants, particularly in climatic zones where inner rooms are cooled at certain times (e.g. in the Mediterranean countries, Southern USA, Japan, Australia, etc.).

Example: well-being
Improved ambient conditions, a better quality of life, easing the ecological burden – all these benefits are readily attainable by covering buildings with greenery.

The greening of buildings meets all the requirements for consideration as an important element in contemporary housing-estate planning.
This zone is characterised by its continental-type climate of short, warm summers and long, severe winters. Evergreen climbing shrubs such as ivy are at their climatic limit in this zone.

- Clematis alpina, sibirica, vitisba, virginiana, macropetala, tangutica
- Parthenocissus quinqufolia
- Polygonum subumbilicalis, baldschuanicum
- Celastrus scandens
- Actinidia kolomikta, arguta, etc. (with edible fruits)
- Vitis aestivalis, amurensis, riparia

Precipitation is evenly distributed throughout the year.

The summers are warm, the winters moderately cold – the climate typical of Central and Western Europe.

Temperatures lower than −15 °C tend to occur rarely in Central Europe, and hard frosts (below −5 °C) are hardly to be expected in oceanic regions such as the broadleaf forest zone of Eastern Asia or New Zealand. In contrast, the temperature can sink to −30 °C and even lower in the north of the USA. The species that flourish in these regions are those listed under the boreal coniferous forest zone heading. Experts should be consulted in case of doubt.

In the regions with a moderately cold winter (Central and Western Europe), a wide range of attractive Clematises, Loniceras, climbing roses, etc., are available in addition to the “classics” listed in zone 1.

Many plants that thrive in Mediterranean regions do well in the mild-winter regions of the deciduous forest zones. The hardier Passiflora species, Solanum crispum and Trachelospermum jasminoides flourish in the company of plants representative of the colder zones.
Such zones are found around the Mediterranean Sea, in California, on the Cape and in South Australia. They are characterised by hot, dry summers and mild, humid winters. Light frosts are exceptional. A great variety of attractive climbers and wall shrubs flourish here in all their splendour. These include Bougainvillea and many Passifloras (Passiflora coerulea, amethystina, mollissima, antioquiensis, Dictis buccinatoria, Podranea ricasoliana, Pandorea jasminoides, Po- dranea ricasoliana, Beaumontia grandiflora...). In addition, somewhat tender climbing roses such as Rosa brunoni ‘La Mortola’ or “Banks’s rose” (Rosa banksiae) do well here. Watering during the summer months is essential.

The hot, frost-free humid or variably humid climate supports lush vegetation consisting of a wide range of plants. Many of these familiar to us in Mediterranean gardens (such as Bougainvillea) grow well in this zone, including those that require considerable warmth such as Thunbergia grandiflora and mysorensis, Passiflora coccinea, quadrangularis (giant granadilla), Petraea volubilis, Clytostoma calistegioides, Allamanda cathartica, Pyrostegia venusta. Many species grow satisfactorily in a warm temperate climate (North Island of New Zealand) as well as in the tropics. Other varieties, however, require the humid heat of equatorial regions (e.g. Strongylodon macrobotrys).

Most of the climbers that are used in zone 4 will grow well in zone 5 when the microclimatic conditions are observed and water management is satisfactory.

Provided that an efficient watering system is available, buildings in these hot, dry regions can be greened to contribute significantly towards a pleasant room temperature. Combination with suitable desert periphery plants (Acacia species, Tamarix, Casuarina, etc.) is good practice because the resulting filter effect slows down wind and drifting sand. Climbers and espaliered plants from the gardens of the usually neighbouring Mediterranean hard-leaf zone such as Kennedya coccinea, Podranea ricasoliana or even Pyrostegia venusta will grow on buildings with considerable vigour when they are well tended and watered.

The zone of opposites. Hot summers are followed by severe winters. The hardy plants listed under borean coniferous forest zone such as Clematis tangutica, alpina and siberica can be used here. Watering is always essential. The oleasters Elaeagnus angustifolia and commutata are suitable for use as windbreaks.

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The short vegetation period makes life difficult for plants that want to climb. However, with careful attention paid to the microclimate (exposure, wind, altitude, topography), the climbers from the coniferous forest zone certainly have a chance of succeeding.

Greening buildings with climbing plants in this vegetation-less zone is virtually impossible. Many species grow satisfactorily in a warm temperate climate (North Island of New Zealand) as well as in the tropics. Other varieties, however, require the humid heat of equatorial regions (e.g. Strongylodon macrobotrys).
**DIMENSIONING TRAINING SYSTEMS**

The overall load of a greened surface is composed of:
- Plant weight
- Wind load on plant surface
- Weight of dew and rain
- Weight of snow
- Weight of training structure

**Load distribution**

If the entire vertical load is absorbed solely by the training system at the top and bottom, the upper suspension must hold the entire vertical load and half the wind load. The bottom suspension must hold only half the wind load.

**The safety factor**

The defined vertical load to be absorbed by the upper suspension must be multiplied by a safety factor.

**A: PLANT WEIGHT**

Depending on the variety, the unit weight per square metre of plant area can vary from 1 to 50 kg/m². The plant weight is influenced by the location, the soil quality, the growth rate and owner care.

**B: HORIZONTAL AND VERTICAL WIRE ROPES**

When computing rope forces, a distinction must be made between horizontally and vertically tensioned wire ropes.

Intermediate supports for rods and wire ropes

The sag (f) of horizontal or inclined rods and wire ropes can be diminished with intermediate supports.

**C: WIND LOAD**

When planning and installing training systems, the wind load is an important aspect. It is composed of wind pressure and wind suction as well as side winds on the greened surface. Although it can be assumed that part of the wind will breeze through the vegetation, we recommend looking at the greened mass as a solid surface.

The following suggested values apply to wind suction calculations:
- Height above ground up to 8 metres: approx. 0.5 kN/m²
- Between 8 and 20 metres above ground: approx. 0.8 kN/m²
- Higher than 20 metres above ground: 1.1 kN/m²

A suction effect on the vegetated surface occurs when the wind blows parallel to the greened surface. The resulting tensile forces must be transmitted to the building structure via the dowels.

Incident side winds impose a bending moment on the spacers. In special cases, it may be necessary to reinforce the spacers and/or guy them down with wire ropes.

Where trainers are subsequently attached to a building structure, it should be determined if and at which locations the computed forces are transmitted and where they can be diverted into the foundation.

In new buildings, it is the planner’s responsibility to investigate whether and how training systems should be included and mounted.

**D: DEW, RAIN, AND SNOW LOADS**

In addition to the weight of the plant, the training structure must also be capable of absorbing dew, rain, and snow loads. This load is factored in by multiplying the plant weight by the following coefficients:

- For deciduous plants: plant weight times 2;
- For evergreens: plant weight times 3.

**E: STRONG TWINING CLIMBERS**

At least one end of the wire rope which holds climbers that twine significantly (Wisteria, for example) must be protected with a Jakob® INOX LINE overload clamp (No. 30920-0400-10, page 65). This is the only way to prevent major façade damage by tensile overloads on spacers (Fig. 2, page 29).
**WALL-MOUNTING SPACERS ON VARIOUS BUILDING MATERIALS**

- **Through hole in wood**
  - Headless screw with nut and check nut at back, front ring nut with support washer to absorb lateral forces at front.

- **Screw-in nut for wood**
  - The metric internal thread of the screw-in nut accepts a rope holder or a headless screw.

- **Perforated hollow wall anchor**
  - The perforated anchor is secured with a two-component mortar. The metric internal thread accepts a rope holder.

- **Bolt anchor with internal thread**
  - Suitable for concrete façades and hard stone.
  - The bolt anchor expands and grips when the threaded rod is screwed in.

- **Externally insulated façades**
  - The perforated hollow wall anchor is secured with a two-component mortar. The metric internal thread accepts a rope holder. A yellow code filament (5) confirms the authenticity of the rope (actual: Ø 3.7 mm).

**Ropes / Rods / Sections**

- **Wall mounts**
  - Eyebolt (1)
  - Spacer Ø 40/100 (2)
  - Eye bolt with support washer (4)

- **Brackets (P) for spacers**
  - Angle section 30 / 30 / 4 mm
  - Angle section 40 / 40 / 4 mm
  - Flat section 30 / 4 mm
  - Flat section 40 / 4 mm

- **Dimensions (mm)**
  - J [mm]
  - W [cm³]
  - kg/m
  - 30 / 30 / 4
    - 4.48
    - 1.81
    - 1.26
  - 40 / 40 / 4
    - 7.00
    - 3.15
    - 2.29
  - 30 / 4
    - 3.59
    - 1.26
    - 1.26

- **Moment of inertia**

**Choosing suitable materials**

The different atmospheric conditions (rural, urban, industrial) determine the selection of materials. Urban and industrial atmospheres may contain aggressive carbon-containing particles and sulphur dioxide (SO2). At sea level, the air contains aerosols with chloride ions. Rural air is usually unproblematic.

- All parts of the Jakob® INOX LINE are made of AISI 316, 1.4401, 1.4404, and AISI 316L, alloys to offer excellent corrosion resistance.

**How to Plan Training Systems**

- **PLANNING AIDS FOR THE ENGINEER**
  - The following parameters are important for planning a training system:
    - Selected plant and its weight per m²
    - Deciduous or evergreen?
    - Which configuration of ropes/rods is needed (horizontal/vertical/combined/inclined, etc.)?
    - Orientation: South / North / East / West?
    - Special site conditions such as wind, etc.
    - Ropes/rod grid aperture and wall clearance (horizontal/vertical/combined/inclined, etc.)?
    - Length and width of greened area (sketch with dimensions)
    - Jakob® INOX LINE catalogue

**Technical Data**

- **Flat section 30 / 4 mm**
  - J = moment of inertia / mm⁴
  - W = moment of resistance / cm³

- **Angle section 30 / 30 / 4 mm**
  - J = moment of inertia / mm⁴
  - W = moment of resistance / cm³

- **Angle section 40 / 40 / 4 mm**
  - J = moment of inertia / mm⁴
  - W = moment of resistance / cm³

**Spacer Load Diagram**

- **Fq (kN)** is the load at which a permanent deformation of the space will occur if the substrate does not yield (kN x 10² = kp)

**Jakob® INOX LINE catalogue**

- See page no. M8
**DIY ASSEMBLY OF END CONNECTORS**

Technically mature end connectors make it possible to complete the termination of the wire ropes on site. Non-tensionable end connectors (A) are swaged with the rope at the factory.

- The rope (B) can be terminated to the correct length on site with the separately supplied LT2 external thread ends (C) (Fig. 45.1, page 45) and wire rope cutters.

**ADJUST AND SECURE ROPE TENSION**

Using the tensionable end connectors (D) which should be located at easily accessible points of the installed training system, the wire ropes can be moderately tensioned.

- If the tension is too high, the spacers and anchors will be unnecessarily burdened. The tension should be great enough to prevent the ropes and plants from being rocked back and forth by the wind.
- The end connectors should be secured with check nuts to prevent unintentional loosening.
- Find out if the training system should be electrically earthed.

**SELECTING THE APPROPRIATE CLIMBERS**

Ecological considerations speak in favour of including indigenous plants in the selection.

- Basically, local greening specialists should be consulted.
- Some ideas are provided on pages 12 to 17.

**CARING FOR GREENED FACADES**

Simple façade vegetation requires little care. Sophisticated and attractive plant combinations with climbing roses, Clematis, grape vines or kiwis need to be cared for by professionals on a regular basis. This care is rewarded with blossoms, fruit, and freedom from pests.

- Training systems that are compatible with the intended plants generally eliminate the need for attaching the plants. Climbing roses and grape vines are exceptions to this rule. However, climbers do need a good manual or automatic water and nutrient supply.

- Pest problems will hardly occur if the plants are compatible with the site. Pesticides should not be used in residential zones.
- Many climbers (such as honeysuckle) only need to be cut back if their growth is to be controlled. Climbing roses, many Clematis varieties, grape vines and kiwis will grow vigorously and stay healthy if professionally cut. They will look better and develop more blossoms and fruit as well.

- In the course of the years, the weight of the plants will increase. It may be necessary to retension the wire ropes or add anchors and reinforcement elements.
GREENGUIDE ROPE STYLE F1/F2/F3
For DIY installation / Material: AISI 316 (V4A)
Completely terminated wire ropes with top and bottom spacers. Types F1, F2, and F3 are designed for different load cases and available for different wall clearances.

GREENGUIDE ROPE STYLE F4
For DIY installation / Material: AISI 316 (V4A)
Training structure tailored to your dimensions. The stainless steel angle sections can be supplied with all mounting holds. The scope of the product line covers various load cases.

GREENGUIDE ROPE STYLE F5
For DIY installation / Material: AISI 316 (V4A)
Training structure tailored to your dimensions. The top and bottom mounting sections can be inclined at any angle (under a pitched roof, for example). Wall clearances and loads variable.

GREENGUIDE ROPE STYLE F6
For DIY installation / Material: AISI 316 (V4A)
The training structure consists of two spacers for the beginning and end of the wire rope as well as of deflectors.
The load and design of a greening system depends on various factors. Please consult pages 18, 19 and 21 for details.

GreeNGuide RoPe StylEs F1/F2/F3
For on-site assembly / Patent/DBGM pending
Material: ropes AISI 316, fittings AISI 316L
To order: see examples on opposite page

- Top spacer
  - for swaged GreeNGuide eye end (non-tensionable end connector)
  - Info: Page 21, 25

- Intermediate spacer
  - clamped for contiguous rope, clamped (rope S2 / S4 / S5)
  - Info: Page 25

- Intermediate spacer, tensionable
  - for external thread with GreeNGuide eye end and turnbuckle (rope S5)
  - Info: Page 25, 45

- Bottom spacer
  - accepts rope ends S2 / S4 / S5
  - Info: Page 21, 25, 47

- Assembled rope lengths
  - indicate partial lengths L1 / L2 at intermediate spacer D3
  - Info: Page 25

- Wall clearances
  - variable to max. 81 / 81 / 106 / 87 / 112 / 162 / 212
  - Info: Page 40 / 41

- Rope with clamped end
  - / / / / / 25

- Rope with tensionable and connector
  - / / / / / 25

- Rope with tensionable and connectors
  - / / / / / 25

- Wall mounting
  - on wood, hollow walls, concrete or external insulation. See installation principles and materials on pages 20, 64

The user is responsible for choosing the correct assembly method (see Fig. 26.5) and the proper rope diameter. Functionality is guaranteed only by Jakob rope No. 10820–0400 with the yellow code filament. Have a civil engineer check strength values and permissible loads on the basis of the given load case (see page 21).
**GREENGUIDE ROPE STYLE F4**

For on-site assembly / Patent/DBGM pending / Material: ropes AISI 316, fittings AISI 316L

To order: see examples on page 31

The load and design of a greening system depends on various factors.

Please consult pages 18, 19 and 21 for details.

Intermediate section P2 can also be used as a bottom mounting section P3, depending on function and load case (see Fig. 30.3, page 30).

On the section (P3 as flat section), it is possible to clamp the end of the rope with the GreenGuide overload clamp (2).

The defined clamping force of 1 kN allows the rope to slip when gripped by vigorously twining climbers, thus lengthening the rope (see page 19, item E, and Fig. 54.2, page 54).

**GREENGUIDE ROPE STYLE F4**

For on-site assembly / Patent/DBGM pending / Material: ropes AISI 316, fittings AISI 316L

To order: see examples on page 31

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The defined clamping force of 1 kN allows the rope to slip when gripped by vigorously twining climbers, thus lengthening the rope (see page 19, item E, and Fig. 54.2, page 54).

**GREENGUIDE ROPE STYLE F4**

For on-site assembly / Patent/DBGM pending / Material: ropes AISI 316, fittings AISI 316L

To order: see examples on page 31

The load and design of a greening system depends on various factors.

Please consult pages 18, 19 and 21 for details.

Intermediate section P2 can also be used as a bottom mounting section P3, depending on function and load case (see Fig. 30.3, page 30).

On the section (P3 as flat section), it is possible to clamp the end of the rope with the GreenGuide overload clamp (2).

The defined clamping force of 1 kN allows the rope to slip when gripped by vigorously twining climbers, thus lengthening the rope (see page 19, item E, and Fig. 54.2, page 54).

**GREENGUIDE ROPE STYLE F4**

For on-site assembly / Patent/DBGM pending / Material: ropes AISI 316, fittings AISI 316L

To order: see examples on page 31

The load and design of a greening system depends on various factors.

Please consult pages 18, 19 and 21 for details.

Intermediate section P2 can also be used as a bottom mounting section P3, depending on function and load case (see Fig. 30.3, page 30).

On the section (P3 as flat section), it is possible to clamp the end of the rope with the GreenGuide overload clamp (2).

The defined clamping force of 1 kN allows the rope to slip when gripped by vigorously twining climbers, thus lengthening the rope (see page 19, item E, and Fig. 54.2, page 54).
**GREENGUIDE ROPE STYLE F4**

*For on-site assembly / Patent DE BM pending / Material: ropes AISI 316, fittings AISI 316 L*

**To order:** See examples on opposite page

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### Upper mounting section

- Angle 30/30/4
- Angle 40/40/4

<table>
<thead>
<tr>
<th>A</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>Info / Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
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<td>Flat 30/4</td>
<td>21, 29, 64</td>
<td></td>
</tr>
<tr>
<td>P2</td>
<td>Flat 40/14</td>
<td>Flat 40/4</td>
<td>21, 29, 64</td>
<td></td>
</tr>
</tbody>
</table>

### Intermediate mounting section

- Angle 30/30/4
- Angle 40/40/4

### Bottom mounting section

- Angle 30/30/4
- Angle 40/40/4

**Max. width with 2 spacers**

- Suggested: approx. 1600 (with W 100 and plant weight 15 kg/m²)

**Max. length with 2 spacers**

- Suggested: approx. 3000 (with W 100 and plant weight 15 kg/m²)

**Wall clearance with spacer Ø 20/50**

- See wall clearance table on pages 40/41

**Wall clearance with spacer Ø 40/100**

- See wall clearance table on pages 40/41

**Possible rope types:** S1 / S3

- See notes on pages 25, 29

### Wall mounting on wood, hollow walls, concrete or external insulation. See installation principles and materials on pages 20, 64

**Mounting sections**

On request, we will supply the stainless steel sections ready to install with all holes (according to binding drawings).

Horizontal rods combined with vertical wire ropes result in ideal training structures. See description on page 29 and the figure below (30.5).

**The load and design of a greening system depends on various factors. Please consult pages 18, 19 and 21 for details.**

---

**Assembled lengths for on-site assembly:**

Please see notes on page 25.

---

**Notes:**

The user is responsible for choosing the correct assembly method (see Fig. 26.5 on page 26) and the proper rope diameter. Functionality is guaranteed only by Jakob rope No. 10820–0400 with the yellow code filament. Have a civil engineer check strength values and permissible loads on the basis of the given load case (see page 21).
The load and design of a greening system depends on various factors. Please consult pages 18, 19 and 21 for details.

Horizontal rods combined with vertical wire ropes result in ideal training structures. Two different methods are available for attaching rods to wire ropes.

- GreenGuide 90° cross clamp
  - No. 30920–0400–02 (Fig. 30.5, page 30)
- Horizontal rod Ø 3.7
  - No. 30922–0400–00 (Page 51)
- Rope clip for stainless steel rods
  - No. 30920–0400–01 (Fig. 52.2, page 52)

Rope type S4
Rope S4 is supplied with a tensionable end connector and is intended for on-site assembly (rope types see page 25).

Wall mounting
on wood, hollow walls, concrete or external insulation. See installation principles and materials on pages 20 and 64.

Top/bottom mounting sections
Depending on the load case, angle sections 40 / 40 / 4 or 30 / 30 / 4 are identical at the top and bottom.

Intermediate section P2 can also be used as a bottom mounting section P3, depending on function and load case (see Fig. 34.3, page 34).

Section connector
The max. length of the flat and angle sections is 2000 mm. The section connector has two slotted holes. (Page 64: No. 30922–3004 and –4004)
**GREENGUIDE ROPE STYLE F5**

*For on-site assembly / Patent/BGMB pending /
Material: ropes AISI 316, fittings AISI 316L*

*To order: see examples on opposite page*

<table>
<thead>
<tr>
<th>P1</th>
<th>P2</th>
<th>P3</th>
<th>P4</th>
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<td>Upper mounting section</td>
<td>Intermediate mounting section</td>
<td>Bottom mounting section</td>
<td>Info: Pages</td>
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<tr>
<td>Angle 30/30/4</td>
<td>Angle 40/40/4</td>
<td>Flat 30/4</td>
<td>Flat 40/4</td>
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</tbody>
</table>

**Max. width with 2 spacers**

- Suggested: approx. 1500 (with W 100 and plant weight 15 kg/m²)

**Max. length with 2 spacers**

- Suggested: approx. 3000 (with W 100 and plant weight 15 kg/m²)

**Wall clearance with spacer Ø 20/50**

- 68 / 85 / 110 – see wall clearance table on pages 40/41

**Wall clearance with spacer Ø 40/100**

- 85 / 110 / 160 / 210 – see wall clearance table on pages 40/41

**Possible rope types:** S2 / S4

- See notes on pages 25, 33

**Wall mounting on wood, hollow walls, concrete or external insulation.** See installation principles and materials on pages 20, 64

**Mounting sections**

- On request, we will supply the stainless steel sections ready to install with all holes (according to binding drawings).

- Horizontal rods combined with vertical wire ropes result in ideal training structures. See description on page 29 and the figure below (34.5).

**The load and design of a greening system depends on various factors.** Please consult pages 18, 19 and 21 for details.

---

**Assembled lengths for on-site assembly:**

- L always applies to the longest wire rope. Please see notes on page 25.

---

The user is responsible for choosing the correct assembly method (see Fig. 26.5 on page 28) and the proper rope diameter. Functionality is guaranteed only by Jakob ropes No.10820–0400 with the yellow code filament. Have a civil engineer check strength values and permissible loads on the basis of the given load case (see page 21).
**GREENGUIDE ROPE STYLE F6**

*For on-site assembly / Material: ropes AISI 316, fittings AISI 316L*

To order: see examples on opposite page

**Info:** Page

- **GreenGuide spacer:** Matches rope type S6 with GreenGuide eye
  - 26, 43
- **Intermediate spacer with ring nut:** Rope guide or deflection point
  - 46/49
- **Spacer with ring nut:** Loop of rope S7 is swaged directly to ring nut
  - 46/49
- **Wall clearances:**
  - 24 / 76 / 93 / 118 (D1 including 12 mm spacer washer)
  - 40/41
- **Possible rope types:** S6 / S7
  - See notes on pages
  - 26
- **Wall mounting:** on wood, hollow walls, concrete or external insulation. See installation principles and materials on pages
  - 60, 64

---

**Assembled lengths for on-site assembly:**

Please see notes on page 25.

The sum of all deflections should not exceed 540°; max. 90° per deflection.

---

The user is responsible for choosing the correct assembly method (see Fig. 26.5 on page 26) and the proper rope diameter. Functionality is guaranteed only by Jakob rope **No. 10820–0400** with the yellow code filament. Have a civil engineer check strength values and permissible loads on the basis of the given load case (see page 21).
SUPERB MATERIALS – EAS Y ASSEMBLY
THE SINGLE ROPE DIAMETER (4 MM) AND ONE THREAD SIZE (M8) MAKE THIS LINE ABSOLUTELY INTEROPERA BLE

All parts of the Jakob® INOX LINE are made of top-quality materials. The two alloys used – AISI 316 (1.4401) and AISI 316L (1.4404) – provide high corrosion resistance and plant compatibility.
### WALL CLEARANCE EXAMPLES

Wall clearance (W) means the distance between the façade and the training system (centre of rope).

<table>
<thead>
<tr>
<th>Eye bolt, slotted, with support washer</th>
<th>No. 30836–0044–01</th>
<th>Unslotted No. 30836–0044</th>
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</thead>
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<tr>
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<td>No. 30836–0064–01</td>
<td>Unslotted No. 30836–0064</td>
</tr>
<tr>
<td>GreenGuide spacer Ø 20 / 50</td>
<td>No. 30919–0058</td>
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<tr>
<td>GreenGuide spacer Ø 20 / 50</td>
<td>No. 30919–0075</td>
<td></td>
</tr>
<tr>
<td>GreenGuide spacer Ø 20 / 50</td>
<td>No. 30919–0100</td>
<td></td>
</tr>
<tr>
<td>Spacer basket Ø 40 / 100</td>
<td>No. 30897–0075</td>
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<tr>
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<td>No. 30897–0150</td>
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<tr>
<td>Spacer basket Ø 40 / 100</td>
<td>No. 30897–0200</td>
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**Component Combinations**

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<tr>
<th>Spaced out</th>
<th>No. 30822–0040</th>
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<tbody>
<tr>
<td>With angle section 30 / 30 / 4 mm</td>
<td>No. 30921–0030</td>
</tr>
<tr>
<td>With flat section 30 / 4 mm</td>
<td>No. 30921–0030</td>
</tr>
<tr>
<td>Swaged GreenGuide eye</td>
<td>No. 30914–0400</td>
</tr>
<tr>
<td>Loop swaged with GreenGuide eye</td>
<td>No. 30915–0400</td>
</tr>
<tr>
<td>GreenGuide rod holder No. 30921–1000–01</td>
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</tr>
<tr>
<td>GreenGuide rod /rope holder No. 30921–1000–04</td>
<td></td>
</tr>
<tr>
<td>GreenGuide overload clamp (on flat section) No. 30920–0400–10</td>
<td></td>
</tr>
<tr>
<td>Spacer washers, three sizes: 4, 6 or 12 mm No. 30922–0800–01 No. 30922–0800–02</td>
<td></td>
</tr>
</tbody>
</table>

---

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COMPONENT COMBINATIONS

1. Spacer basket Ø 40/100
   with four different wall clearances

2. Swaged GreenGuide eye for rope Ø 4 mm
   (dome nut M8, p. 6/6)

3. Angle section
   in two sizes:
   30/30/4 or 40/40/4 mm

4. Swaged radius head
   end stop
   for rope Ø 4 mm

5. Climber stud
   UV-resistant plastic
   Colour grey

6. GreenGuide cross clamp 90°
   UV-resistant plastic
   Colour grey

7. Rope clip for stainless steel rod
   UV-resistant plastic
   Colour grey

8. End cap
   for wooden rod Ø 25 mm

9. GreenGuide spacer
   Ø 20/50
   with three wall clearances

10. Wooden rod holder
    Rd. special Mininut
    for wooden rod Ø 25 mm

11. Horizontal rod Ø 3.7
    for combinations
    with vertical ropes

12. Wooden rod Ø 25
    glazed spruce (grey)
    or untreated larch

13. Wooden rod holder
    accepts rope guide point

14. GreenGuide overload clamp
    as a rope guide point

15. Stainless steel rope Ø 4
    Construction 6x7 + SE

16. Turnbuckle with
    GreenGuide eye LT2
    for on-site assembly
We assemble all end connectors with wire ropes that are manufactured in-house. Jakob® wire ropes are subject to strict quality inspections. All components are carefully matched. This assures superior functionality and compliance with guaranteed breaking loads. For safety reasons, use only Jakob® wire ropes in combination with items designed for on-site assembly. See description on page 21.

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ROPE / EXTERNAL THREADS

For on-site assembly

Breaking strength:
90% of minimum rope-breaking load

TURNBUCKLE WITH EXTERNAL THREAD LT2
For on-site assembly

Breaking strength:
90% of minimum rope-breaking load

SWAGED EXTERNAL THREAD END
Breaking strength:
90% of minimum rope-breaking load

We assemble all end connectors with wire ropes that are manufactured in-house. Jakob® wire ropes are subject to strict quality inspections. All components are carefully matched. This assures superior functionality and compliance with guaranteed breaking loads. For safety reasons, use only Jakob® wire ropes in combination with items designed for on-site assembly. See description on page 21.
**INOX LINE**

---

**Breaking strength:**

- **S** Without thimble
- **L** With thimble

---

**Swaged parts:**

- **Breaking strength:** 30% of minimum rope breaking load
- **Lengthens the compression sleeve by about 3%**

---

**Tensioning range information:**

- 
  - Make longer (relax)
  - Make shorter (tension)

---

**The user is responsible for choosing the correct assembly method and the proper rope diameter. Functionality is guaranteed only by Jakob rope No.10820~0400 with the yellow code filament.**

---

**Rope end should protrude at least 20 mm if not welded**

---

**Swaged parts:**

- **The swaging process lengthens the compression sleeve by about 3%**

---

**See page no.**
WEBSHIELD
This multifunctional mesh is made of stainless steel wire rope dimensioned to customer specifications. Please contact us for customised planning with WEBNET. Other rope Ø on request.

Correct wall mounting (see page 20) is the responsibility of the user. Strength ratings and permissible loads based on the application must be calculated by a qualified engineer (see page 21).

Corrected wall mounting (see page 20)

Curved mounting surface (see pages 58/59).

Correct wall mounting is the responsibility of the user. Strength ratings and permissible loads based on the application must be calculated by a qualified engineer (see page 21).

Curved mounting surface (see pages 58/59).
Adjustable cross clamp with support washer

This product may be used only as an intermediate rope guide (not as an end connector). Dimension b1 corresponds to the distance between the wall and the inner wire rope.

The user is responsible for choosing the correct assembly method and the proper rope diameter.
The user is responsible for choosing the correct assembly method. Strength ratings and permissible loads based on the application must be calculated by a qualified engineer (see page 21).

Fig 54.2: The GreenGuide overload clamp (page 65) clamps the end of the wire rope. The defined clamping force of 1 kN allows the rope to slip when gripped by vigorously twining climbers, thus lengthening the rope (see page 19, item E).

Costs per cut:
- Ø 8.5
- Ø 10.5

The user is responsible for choosing the correct assembly method. Strength ratings and permissible loads based on the application must be calculated by a qualified engineer (see page 21).

Fig 54.2: The GreenGuide overload clamp (page 65) clamps the end of the wire rope. The defined clamping force of 1 kN allows the rope to slip when gripped by vigorously twining climbers, thus lengthening the rope (see page 19, item E).

Costs per cut:
- Ø 20
- Ø 8.2
- Ø 10.2

The user is responsible for choosing the correct assembly method. Strength ratings and permissible loads based on the application must be calculated by a qualified engineer (see page 21).

Fig 54.2: The GreenGuide overload clamp (page 65) clamps the end of the wire rope. The defined clamping force of 1 kN allows the rope to slip when gripped by vigorously twining climbers, thus lengthening the rope (see page 19, item E).

Costs per cut:
- Ø 20
- Ø 8.2
- Ø 10.2

The user is responsible for choosing the correct assembly method. Strength ratings and permissible loads based on the application must be calculated by a qualified engineer (see page 21).

Fig 54.2: The GreenGuide overload clamp (page 65) clamps the end of the wire rope. The defined clamping force of 1 kN allows the rope to slip when gripped by vigorously twining climbers, thus lengthening the rope (see page 19, item E).

Costs per cut:
- Ø 20
- Ø 8.2
- Ø 10.2

The user is responsible for choosing the correct assembly method. Strength ratings and permissible loads based on the application must be calculated by a qualified engineer (see page 21).

Fig 54.2: The GreenGuide overload clamp (page 65) clamps the end of the wire rope. The defined clamping force of 1 kN allows the rope to slip when gripped by vigorously twining climbers, thus lengthening the rope (see page 19, item E).

Costs per cut:
- Ø 20
- Ø 8.2
- Ø 10.2
The user is responsible for choosing the correct assembly method and the proper rope diameter. Functionality is guaranteed only by Jakob rope No. 10820-0400 with the yellow code filament. Strength ratings and permissible loads based on the application must be calculated by a qualified engineer (see page 21).

- **Functionality**: is guaranteed only by Jakob rope No. 10820-0400 with the yellow code filament.

- **Strength ratings and permissible loads**: based on the application must be calculated by a qualified engineer (see page 21).

- **Tensioning range information**: both thread ends are screwed halfway into the turnbuckle body.
  - = make longer (relax)
  - = make shorter (tension)

- **Right-hand thread**
- **Left-hand thread**

---

**TENSIONER FITTINGS**

**Eye thickness**: = 12 mm

- **No. 30922-0600**
  - With 5 tensioner fittings (G1 / G2 / G3 / G4 / G5)
  - With 3 tensioner fittings (G1 / G3 / G5)
  - Without ropes

- **No. 30922-0600-02**
  - With 5 tensioner fittings (G1 / G2 / G3 / G4 / G5)
  - With 3 tensioner fittings (G1 / G3 / G5)
  - Without ropes

- **No. 30922-0600-04**
  - With 5 tensioner fittings (G1 / G2 / G3 / G4 / G5)
  - With 3 tensioner fittings (G1 / G3 / G5)
  - Without ropes
End cap
Stainless steel rod
see page 65
Wooden rod holder
Wooden rod
Wooden rod connector

Wall mount
see mounting principle on page 20 and assembly aids on page 64.
Spacer
Depending on load and desired wall clearance (see pages 49 and 51).
Radiused head screws with special Mininut contained in the scope of delivery of wooden rod fittings.
Hammer pins are available for all wooden rod fittings in place of radiused head screws. Caution: hammer pins cannot be removed once installed!

GreenGuide cross clamp
see page 52
Rope clip for stainless steel rod
see page 52

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Wooden rod fittings are available with:
- Radiused head screws – 01
- Hammer pins – 02

Possible wall clearances (max. lateral force see page 21):
- Spacer basket Ø 40/100 (page 51): W = 100 / 125 / 175 / 225 mm
- Spacer Ø 20/50 (page 49): W = 83 / 100 / 125 mm
- Spacer Ø 12/24 (page 49): W = variable, max. 80 mm
- Support washer Ø 50 (page 50): W = 31 mm

Spucer: glazed, grey, not drilled
Larch: untreated, not drilled
Larch: untreated, drilled

Support washer Ø 50 (page 50):
- W = 31 mm

Wooden rod connector
- No. 30923-
  - 0001-01
  - 0001-02
  - with radiused head screws (-01)
  - with hammer pins (-02)

Wooden rod holder with special Mininut:
- No. 30923-
  - 0002-01
  - 0002-02
  - with radiused head screws (-01)
  - with hammer pins (-02)

Swaged end stop
- No. 30923-
  - 0003-01
  - 0003-02
  - for stainless steel rod

End cap for wooden rod
- No. 30923-
  - 0004
  - max. 100

Possible wall clearances:
- Spacer basket Ø 40/100 (page 51): W = 100 / 125 / 175 / 225 mm
- Spacer Ø 20/50 (page 49): W = 83 / 100 / 125 mm
- Spacer Ø 12/24 (page 49): W = variable, max. 80 mm
- Support washer Ø 50 (page 50): W = 31 mm

Spucer: glazed, grey, not drilled
Larch: untreated, not drilled
Larch: untreated, drilled

Wooden rod system
- No. 30923-
  - 0006
  - max. 100
  - C
  - 0007
  - D
  - 0008
  - E
  - 0009
  - F

Possible wall clearances:
- Spacer basket Ø 40/100 (page 51): W = 100 / 125 / 175 / 225 mm
- Spacer Ø 20/50 (page 49): W = 83 / 100 / 125 mm
- Spacer Ø 12/24 (page 49): W = variable, max. 80 mm
- Support washer Ø 50 (page 50): W = 31 mm

Spucer: glazed, grey, not drilled
Larch: untreated, not drilled
Larch: untreated, drilled

Wooden rod fitting:
- No. 30923-
  - 0004
  - max. 100

Possible wall clearances:
- Spacer basket Ø 40/100 (page 51): W = 100 / 125 / 175 / 225 mm
- Spacer Ø 20/50 (page 49): W = 83 / 100 / 125 mm
- Spacer Ø 12/24 (page 49): W = variable, max. 80 mm
- Support washer Ø 50 (page 50): W = 31 mm

Spucer: glazed, grey, not drilled
Larch: untreated, not drilled
Larch: untreated, drilled

Wooden rod system:
- No. 30923-
  - 0006
  - max. 100
  - C
  - 0007
  - D
  - 0008
  - E
  - 0009
  - F

Possible wall clearances:
- Spacer basket Ø 40/100 (page 51): W = 100 / 125 / 175 / 225 mm
- Spacer Ø 20/50 (page 49): W = 83 / 100 / 125 mm
- Spacer Ø 12/24 (page 49): W = variable, max. 80 mm
- Support washer Ø 50 (page 50): W = 31 mm

Spucer: glazed, grey, not drilled
Larch: untreated, not drilled
Larch: untreated, drilled
**Bolt Anchor**

With manual thread.

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<tr>
<th>No. 30803-</th>
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<tbody>
<tr>
<td>M8</td>
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**TVM Mortar**

High-strength, cold- or hot-processed concrete, suitable for all types of concrete. It is also suitable for hollow walls.

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<tr>
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**Ramp Screw-in Nut**

Flax with tapped holes for screw-in nuts. Suitable for frame work.

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<thead>
<tr>
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**Eye Bolt with Washer**

Specifications: Eye bolt with washer.

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**Hexagon Head Cap Screw**

DIN 3367

<table>
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<tr>
<th>No. 30843-</th>
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**Socket Head Screw**

DIN 933

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**Washer**

DIN 433

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**Dome Nut**

DIN 1587

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**Hexagon Nut**

DIN 934

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**VC3 thread lock fluid**

Lacquer-like coating which contains two separate micro-encapsulated components. The locking action becomes effective when a male and female thread pair is tightened. The connection becomes vibration-proof. The thread lock fluid prevents self-loosening.

**GreenGuide Overload Clamp**

Slip element for vigorous twiners.

<table>
<thead>
<tr>
<th>No. 30920-</th>
<th>0800-05</th>
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<tbody>
<tr>
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**Horizontal Rod**

Ø 3.7

<table>
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<tr>
<th>No. 30922-</th>
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<tbody>
<tr>
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**GreenGuide Overload Clamp**

Slip element for vigorous twiners.

<table>
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<th>No. 30920-</th>
<th>0800-00</th>
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<tbody>
<tr>
<td>M8</td>
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</tbody>
</table>

**Climber Stud**

Uncreosorised galvanized steel.

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<th>No. 30906-</th>
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**Victory Mortar**

Mortar with high-strength binding properties, suitable for all types of concrete. It is also suitable for hollow walls.

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**Air-Compressed Anchor**

Mortar and mastic. Suitable for all types of concrete. It is also suitable for hollow walls.

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**VC3 thread lock fluid**

Lacquer-like coating which contains two separate micro-encapsulated components. The locking action becomes effective when a male and female thread pair is tightened. The connection becomes vibration-proof. The thread lock fluid prevents self-loosening.

**TVM Mortar**

High-strength, cold- or hot-processed concrete, suitable for all types of concrete. It is also suitable for hollow walls.

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**GreenGuide Overload Clamp**

Slip element for vigorous twiners.

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**Horizontal Rod**

Ø 3.7

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