

P R E S T R E S S E D
C O N C R E T E
T E C H N O L O G Y



Anchor Grips



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PAUL Anchor Grips to meet the highest standards

PAUL anchor grips have now been on the market for several decades. They are used for pretensioning and post-tensioning operations in practically every country around the world.

Of all manufacturers, there is little doubt that we offer the widest range of anchor grips and are in a position to supply grips ex stock for virtually every wire and strand diameter used. Apart from that our manufacturing facilities are so organized that any special sizes or grips needed for special applications, that are not held in stock, can be manufactured and supplied with short delivery times.

PAUL anchor grips meet the highest demands for economy, safety and practicability in the industrial production of prestressed concrete elements – thanks to our long years of experience and constant improvements in the raw materials used, and in our manufacturing processes and quality control.

It is our objective also to maintain and improve our leading position in the future. Our research and development work contributes appreciably to our chances of achieving this objective and thus we are constantly developing and testing anchor grips for every imaginable application, for pretensioning and post-tensioning, using testing machines of our own design for the necessary static and dynamic tests.

PAUL Anchor Barrels

Our anchor barrels are made of high-tensile alloy steels, whereby we use only crack-tested materials. The large quantities we manufacture enable us in most cases to use a special process that offers the advantages of ensuring: - a high degree of dimensional accuracy – high resistance to wear – an ability to deform under heavy load – automatic rejection in the course of manufacture of any barrel material that has structural defects.

It is only after subsequent ultrasonic testing for cracks that the barrels are stamped and released for dispatch and thus a high degree of working safety and protection against failure is ensured.

PAUL Anchor Wedges

Our anchor wedges are made of a case-hardened steel that is specially molten for us in charges of 100 to 150 tons.

A high degree of dimensional accuracy, automated production, careful heat treatment and strict quality control ensure our products being of the highest quality. By subjecting the wedges to 100% hardness testing and 100% tooth-form testing by means of computer cameras, followed by automatic assembly and the performance of tensile tests, PAUL expends far more effort on testing than is officially required, for example, for post-tensioning wedges.



Automatic lathes for the production of anchor wedges



Automatic testing and assembly machines for anchor wedges



Pretensioning wedges packed in polystyrene boxes

V Pretensioning Grips

Pretensioning grips are anchor grips designed for multi-use. They are chiefly used in the production of factory-made members where the concrete is cast around previously tensioned tendons. Such anchor grips are made to high quality standards to ensure that a high number of reuses is obtained.

Three types are offered:

- Open type (A-Type anchor grips)
- Enclosed type (F-Type anchor grips)
- Couplers (K-Type anchor grips)

It is particularly important that pretensioning grips be cleaned and serviced as detailed in our instructions. Given suitable care and attention they can be reused a great many times.

It is not possible to say just how many times such anchor grips can be reused as this will depend on the stressing force applied, on the type and hardness of the prestressing steel used, on the size and robustness of the anchor grips concerned and on the care with which they are cleaned and serviced. As a general rule, pretensioning wedges and the wearing parts of F-Type grips (springs, press-in tubes, etc) can be used between 50 and several 100 times. The number of reuses of the barrels is generally a multiple of that of the anchor wedges.

Although designed for use as pretensioning grips, A-Type (V) anchor grips are often also used as post-tensioning (N) grips.

N Post-tensioning Grips

Post-tensioning grips are normally used in the production of post-tensioned concrete elements. These anchor grips remain in the concrete unit. Apart from the need for good quality, economy also plays a role.

Post-tensioning anchor grips are of a quality designed for use some 1 – 20 times, depending on the diameter of the wire/strand and the size of anchor grip concerned.

Our range of post-tensioning grips includes

- Anchor wedges
- Single-wire/strand anchor grips in the A and K version
- Anchor wedges of special design, such as compression wedges for dead anchorages, detensioning wedges for the detensioning of tendons, specially treated wedges for high breaking loads and high vibratory stresses, and also anchor wedges for use at very low temperatures.

S Special Grips

Under special grips we generally include open barrels (A-Type grips) with their associated wedges, generally of heavy, robust construction, for special applications, such as for the anchoring of large-diameter, helically ribbed steel bars, the anchoring of structural steel bars for tensile tests, the stressing of 2 or 3 strands by means of a single set of wedges, the stressing of large diameter wire ropes, etc.

Under special grips we also include any anchor grips that are not very common and seldom asked for. Such special grips are generally required in relatively small quantities and have often to be made to customers' specific requirements.

The tables of special grips also list discontinued (DT) types. These are anchor grips that are no longer in production but of which stock is still held that can be offered at an attractive price. The catalogue does not always distinguish between special and discontinued types.

Information concerning availability and stock holdings will be given on request.

The influence of standards for prestressed concrete structure planning on the choice of anchor grips

For pre-tensioned concrete (casting-bed production) 7-wire prestressing strands are permissible with a max. cross sectional area of 100 mm² (0.52" strand, 12.7 – 12.9 mm diameter) and strength classes of 1770 to max. 1860 MPa (N/mm²)

For post-tensioned concrete, approved stressing systems use 7-wire strands with a cross sectional area of up to 150 mm² (0.62" strand) in the same strength classes.

According to DIN EN 10138-1/2/3:2009 high-tensile wires, i.e. two- and three-wire strands with a smaller cross section can be produced with a strength of up to 2160 MPa + 15%. In this connection it should be noted that PAUL anchor wedges may only be used for prestressing steel with maximum actual strengths of up to 2200 MPa (N/mm²), and this must be stipulated to the prestressing steel supplier in a corresponding order specification.

Prestressing steel with a strength exceeding 2200 MPa cannot be safely anchored in the long term.

Only use strands with left-hand twist! Strands with right-hand twist will cause the screw connections on couplers and stressing jack to open during stressing.

Prestressing forces to DIN EN 1992-1-1:2011-01 (Eurocode 2)

Maximum prestressing force during stressing

$$P_{\max.} = A_p \cdot \sigma_{p,\max}$$

Explanation:

A_p = cross sectional area of prestressing steel

$\sigma_{p,\max}$ = maximum prestressing steel stress

$$\sigma_{p,\max} = k_1 \cdot f_{pk} \quad \text{or}$$

$$= k_2 \cdot f_{p0.1k}$$

The lower value applies.

Recommended values for $k_1 = 0.80$
 $k_2 = 0.90$

Applies to overstressing: (subject to measuring accuracy of stressing jack $\leq \pm 5\%$)

$$P_{\max.} = A_p \cdot k_3 \cdot f_{p0.1k}$$

Value recommended for $k_3 = 0.95$

The values $k_1 - k_3$ can be determined in the national appendices specifically for each country. In Germany they are:

$$k_1 = 0.80 \quad \text{accordingly valid for Germany:} \quad \sigma_{p,\max} = 0.80 \cdot f_{pk}$$

$$k_2 = 0.90 \quad \text{or:} \quad \sigma_{p,\max} = 0.90 \cdot f_{p0.1k}$$

$$k_3 = 0.95$$

Maximum prestressing force after stressing

$$P_{m0} = A_p \cdot \sigma_{pm0}$$

$$\sigma_{pm0} = k_7 \cdot f_{pk} \quad \text{or}$$

$$= k_8 \cdot f_{p0.1k}$$

The lower value applies. Recommended values for $k_7 = 0.75$; $k_8 = 0.85$

Specifically determined for Germany:

$$k_7 = 0.75 \quad \text{accordingly valid for Germany: } \sigma_{pm0} = 0.75 \cdot f_{pk}$$

$$k_8 = 0.85 \quad \text{or: } \sigma_{pm0} = 0.85 \cdot f_{p0.1k}$$

For calculating the prestressing force required for the production on casting beds, σ_{pm0} increased by the losses from:

- Elastic contraction of the concrete component on detensioning
- Friction at the deflection points (e.g. in the case of desirable deflection)
- Short term relaxation of the prestressing steel
- Wedge-pull-in loss (mostly only on the stressing end, when stressing to the force required)

The prestressing steel stress determined in this way must be lower than $\sigma_{p,max}$. $\sigma_{pm0} + [\text{loss}] < \sigma_{p,max}$

The anchor grips used must be capable of bearing the temporary maximum stress $\sigma_{p,max}$.

The prestressing steel stress $f_{p0.1k}$ can be calculated according to the European standard EN 10138 from the characteristic strength of the prestressing steel R_m . The conversion factors vary according to the strand or wire strength concerned. R_m corresponds to f_{pk} .

For strand with $R_m \leq 1920$ MPa the following is valid:

$$f_{p0.1k} = 88\% \text{ of } R_m$$

Both the value $f_{p0.1k}$ and the modulus of elasticity are contained in the relevant steel manufacturers' technical approval for prestressing steel. For instance a current German technical approval specifies

for strand 1570/1770 $f_{p0.1k} = 1520$ MPa

for strand 1660/1860 $f_{p0.1k} = 1600$ MPa.

These values slightly differ from the characteristic value. Relevant are the values indicated in the technical approval.

Modulus of elasticity:

for prestressing wire $E = 205$ GPa (kN/mm²),

for strand $E = 195$ GPa (kN/mm²).

Remark on Anchor Grips

The widespread A/F/K 38-28 anchor grip series may only be used for a prestressing force of up to 140 kN. The associated type 28 wedges for multi-use achieve a safe service load of approx. 130 kN (see column 13). This means that when applying the maximum stress according to DIN, only strand with a strength of 1770 MPa and a cross sectional area of 93 mm² may be used. High-tensile strand with a larger cross section may also be stressed, however, to a maximum force of 130 kN (without utilizing the maximum stress $\sigma_{p,max}$). Select wedges with a 1 mm tooth pitch.

For a stressing force exceeding 130 kN we recommend the A/F/K 42-30 anchor grip series with type 30 wedges.

Legend:

$\sigma_{p,max}$	max. stress introduced into the prestressing steel during stressing
$\sigma_{pm0(x)}$	stress in prestressing steel immediately after stressing or after the force has been introduced into the concrete
$R_m (f_{pk})$	characteristic value of the tensile strength of the prestressing steel (characteristic strength).
$f_{p0.1k}$	characteristic value of the 0.1% elongation limit of the prestressing steel
A_p	cross-sectional area of the prestressing steel
P_{max}	max. force applied during stressing
$P_{m0(x)}$	prestressing force immediately after stressing or following the force being introduced into the concrete

Quality assurance in the production of anchor grips

Faulty or damaged anchor grips are a source of particular annoyance since they cause delay and reduce efficiency but far worse than any such annoyance is the risk of even fatal accidents that is involved if faulty grips are used. This alone is reason enough for PAUL to set extremely high standards for the quality of their anchor grips.

High quality can only be ensured if anchor grips are regularly and comprehensively checked and so we subject our grips to extremely intensive tests – some automatic, some manual – in order to be sure that none leave our works that do not meet our own highly critical standards in respect of safety and effectiveness.

In our works the quality of the grips is checked against a specific detailed testing schedule. Our own test standards (81-000.01, 81-000.02, etc.) cover all production stages and all criteria that must be fulfilled to ensure 100% faultless quality.

We supply far more than a million anchor grips per year to customers around the world. A decisive reason for our success is that our quality controls are particularly strict and comprehensive.

Quality assurance by the user

Once the anchor grips have left our works, we (unfortunately) have no way of ensuring that their high quality will be maintained. For this reason, it is of the utmost importance that our customers also contribute to quality assurance in order to ensure that our anchor grips are maintained in a safe and efficient condition.

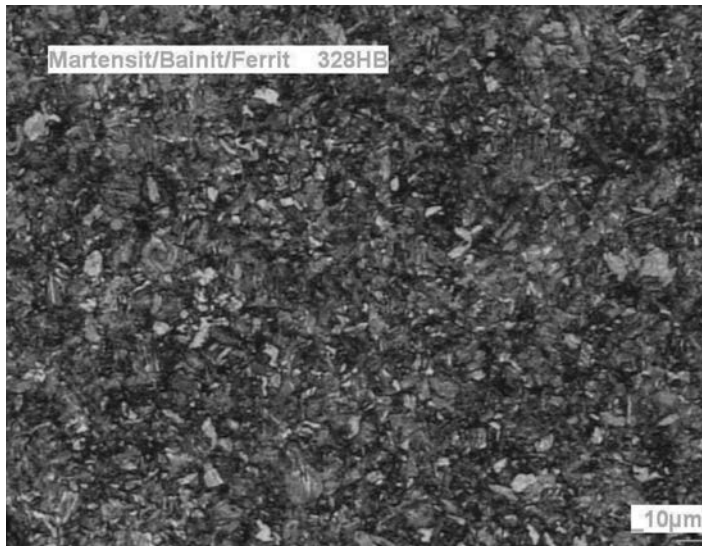
Anchor grips must be cleaned and serviced as often as necessary, depending on how dirty they become. Only if they are regularly and comprehensively checked can it be ensured that no worn or damaged anchor grips are made use of (also see B 441.20/1).

We are always pleased to advise on the necessary service operations and so all our customers are given detailed instructions on how anchor grips should be cleaned, serviced and inspected to ensure that they are fit for further use.

We also offer suitable products for cleaning and preservative agents for protecting the anchor grips.

Material

We require our material suppliers to provide us with material certificates to DIN EN 10204-3.1.B. Both the anchor wedges and anchor barrels are made of high-quality material that is specially molten and made to PAUL's specific order specification. Only specialized suppliers are capable of melting barrel material in such a way that metallic and non-metallic impurities are kept to an absolute minimum. Before the first machining operation samples are taken which are subjected to micrograph tests to analyse their structure, composition and heat treatment.



Material sample (micrograph test) of heat-treated anchor barrel material

Inspection for dimensional accuracy

Some 5% of the wedges are checked as they come from the lathe to ensure that their contours agree with the drawing dimensions. A profile projector makes it possible to detect with the naked eye, deviations of less than 0.1 mm from the "ideal line".

On cutting the internal threads 1% of the wedges are checked for the cleanness and sharpness of their threads.

Thereafter the wedges are sawn into two or three segments, depending on the type of grip. These segments that are later assembled again to complete wedges must be identical one with another as otherwise there would be a risk of the tensioned steel slipping. To ensure that they are identical, the cutting angle is checked on 1% of the wedge segments.



Tensile tests

All the tests so far performed will still not ensure the quality and, more particularly, the safety of the wedges and so with PAUL they are also subjected to tensile tests according to an established scheme. Depending on the type, the wedges are subjected several times to loads equalling 65% and 80% of the breaking load of the wire or strand with which they are to be used and then once right through to breakage. Of the pretensioning wedges, ones with the lowest and ones with the highest hardness are stressed 10 times with 80% of the breaking load and then once right through to breakage.



Hardness testing and final inspection of the threads

The wedge-shaped segments are hardened to 60 – 65 HRC. In the hardening shop they are subjected to stringent tests, the results of which are recorded for each delivery. Additional tests are carried out in the PAUL factory. In a manual test on 1% of the wedges the surface hardness, core hardness and case of depth are checked. In addition, every single post-tensioning wedge and most of the pretensioning wedges undergo an automatic surface hardness test.

PAUL developed special machines to test the surface hardness, tooth form and other dimensions and to automatically assemble the wedge segments to complete wedges. Post-tensioning wedges are also dipped in a corrosion-protection agent.



Inspection of threads



Packing



Automatic testing and assembly machine for testing hardness, tooth form and dimensions

Ultrasonic testing of anchor barrels

The anchor barrels must be absolutely free of cracks as can be well understood if one thinks of the stresses they are required to bear and of what could happen if they were to fail. Although our barrels are turned from bars that are guaranteed by the supplier to be free of cracks, all are tested again before delivery on an ultrasonic tester. Only such barrels as have passed this test twice in succession are stamped as having been tested and released for delivery.



Documentation of quality

Documents accompanying the goods delivered:

Once all the inspections and tests have been performed and the perfect quality of the anchor grips has been ascertained and confirmed in the respective inspection sheets, the anchor grips are released for shipment. They will be accompanied by the following documents:

- Delivery Note
- Supplement to Delivery Note for Anchor Grips (this documents includes details on quantity, number of packing units, batch number, material and melt number)
- Inspection and Maintenance: Clamping Jaws/Anchor Grips, B 441.20/1 (only for pretensioning grips (V))
- Directions for Safety and Accident Prevention, B 246.03/1

Documents accompanying the invoice:

- Certificate of Quality Assurance for Post-Tensioning Wedges, 81-000.05

Documents available on request:

- Certificate of Compliance with The Order DIN EN 10204-21 (81-000.33)
- Material Certificate DIN EN 10204-3.1.B
- Other quality documents such as hardness statistics, test certificate, etc.

Fatigue endurance and static fracture tests

Newly developed anchor wedges are subjected to a particularly comprehensive and stringent test program in order to be sure they meet the approval requirements of prestressing systems (e.g. FIB, DIN EN 13391 or ETAG 013). These tests include static and dynamic tensile tests in order to determine the effect the wedge shape has on the strands.

The static tensile tests include one at breaking load when it is required that at least 97% of the strand breaking load is reached.

While anchored by means of the (newly-developed) wedges, single tendons are stressed in a special machine to 65 – 80% of their breaking load and are then subjected to exactly defined vibrations. Only when not only the wedge but also the tendon has passed this dynamic tensile test (e.g. 2 million load cycles) is the wedge released by PAUL for supply. The results of such tests are documented (with pictures) and such documentation can be made available to users when required. These pretests are an important basis for the subsequent tests required for the acquisition of an approval for a post-tensioning system.

Pretensioning wedges are particularly tested for their suitability to achieve a high number of reuses.

Tensile tests at 65%, 80% and at strand breaking load are carried out regularly.



Samples of anchor grips subjected to static and dynamic tests

Accident prevention and safety precautions



Prestressing Operations

As manufacturers of machinery and equipment for the production of prestressed concrete we are endeavoured to make our products as safe as possible. For this purpose we carry out extensive and stringent quality controls to ensure that only absolutely perfect products leave our works.

However, the responsibility for the safe use of PAUL products lies with you, the user.

Prestressing, whether done in open beds in precast concrete plants or by post-tensioning on construction sites, can be very dangerous. It, however, does not need to be unsafe, in particular,

- if the necessary safety precautions are taken and the applicable regulations complied with
- if the operations are carried out correctly
- if all the equipment and components are used for the correct purpose and in accordance with the instructions.

To obtain a maximum of working safety, please follow our 'Directions for safety and accident prevention' (B 341.11/1) which are included in each operating manual.

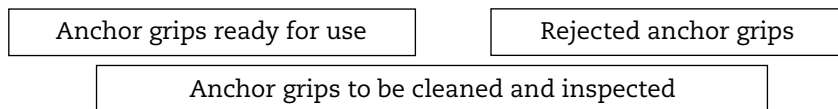
The most important points contained therein are as follows:

- Prestressing operations must only be carried out by properly trained persons. Never use inexperienced workers or workers who may be impaired by drugs or alcohol to work on a prestressing operation.
- Ensure that the operating staff have read and understood the relevant operating instructions and the notes on accident prevention.
- Make sure that all persons who have to carry out stressing operations follow the accident prevention regulations.
- During stressing never stand before or behind the stressing jack, but always beside it. Except for the stressing jack operator persons must stay clear of the stressing bed and a certain safety zone on either side of it and also keep clear of the areas behind the tendons.
- Prepare the protection devices required for covering the prestressing wires/strands before stressing.

(The complete text of the directions for safety and accident prevention (B 341.11/1) is supplied with each delivery or on request).

Special rules to follow in using PAUL Anchor Grips

1. Never use prestressing steel (strand) with an actual strength exceeding 2200 MPa. Stipulate this requirement in the order specification to the steel supplier.
2. Only use original PAUL grips and original PAUL spare parts. Never mix parts made by different manufacturers.
3. Only use carefully cleaned, inspected and lubricated anchor grips since the failure of anchor grips can lead to life-threatening situations. To avoid confusion, we recommend that anchor grips be sorted and stored in separate boxes, marked as follows:



For information on cleaning intervals and cleaning agents, please see Sheet B 246.01/1 and on anchor chucks, B 441.20/1.

4. Never strike an anchor barrel with metal hammers, rocks, rebars, etc.
5. Never conduct welding or flame cutting operations near bare strand or grips. Do not ground welding apparatus to strand, grips or any metal near or in contact with the former.
6. Never use grips with dirty, corroded or greasy wire/strand.
7. Never use barrels which are dented, cracked or scored by wedges.
8. Never use wedges which are worn or cracked, especially with cracks at right angles to the axis of the strand (see Sheet B 441.20/1).
9. Only use parts of the same size to reassemble a strand grip.
10. Never use a coupler where the wedges are jammed due to ingress of concrete water.

11. Never use couplers before having checked that the barrel is fully screwed onto the coupling piece.
In particular, right-hand helical strands tend to unwind to the left when, in the worst case, the barrels could loosen from the coupling piece.
12. Always take care that the strands or wires to be coupled are inserted into the coupler barrel as far as possible.
For this purpose mark the strands before coupling or use couplers with safety coupling pieces which are provided with sight holes allowing to check the correct position of the strand.
13. Never exceed the loads indicated in the tables of this brochure. The maximum working load of the anchor grips is stamped into the barrel. However, this is only valid for the wedge that is optimally suited to the barrel used. Also observe the permissible working load of the wedge concerned.



Anchor Grips

Open Grips



Open or A-Type grips are the least expensive, most robust and most commonly used type of grip. They are easy to handle and to clean and are generally used at the stressing end of the casting bed. When used with single-wire stressing jacks with hydraulic lock-off facility open grips have the advantage that pull-in losses are reduced to an absolute minimum. Also on detensioning they are very easy to handle. Open grips are also often used as post-tensioning grips.

Note: With open grips, wedges can be lost. Wedges can also loosen during operation, i.e. before the stressing force is applied.

Enclosed Grips



Enclosed or F-Type grips are mostly used at the non-stressing end of the bed. They are available with bayonet cap or with screwed cap.

Compared with the open type, enclosed grips have the advantage that they are faster to apply to the prestressing steel and they avoid the risk of wedges being lost.

The patented press-in tube ensures that pull-in losses on the stressing end are kept very small.

Note: Detensioning of any prestressing wire/strand that may have been incorrectly placed or excessively stressed is more difficult and grips of this type are more difficult to clean. They are also more liable to damage than A-Type grips, because of their cap, press-in tube and spring.

Couplers



The use of couplers makes it possible to save wastage of prestressing steel in pretensioning work. They are available for joining together wires/strands of identical or of differing diameter.

Note: An increased amount of work is involved in joining two lengths of steel together and it is essential for the utmost care to be taken as otherwise there would be a risk of injury if a wire should pull out of a coupler (see page 11).

It is thus of the greatest importance that certain precautionary measures be taken:

- Couplers that have already been used must be most carefully cleaned;
- It must be ensured that the prestressing steels are fully inserted;
- It must be ensured that the barrels are screwed fully onto the center coupling piece.

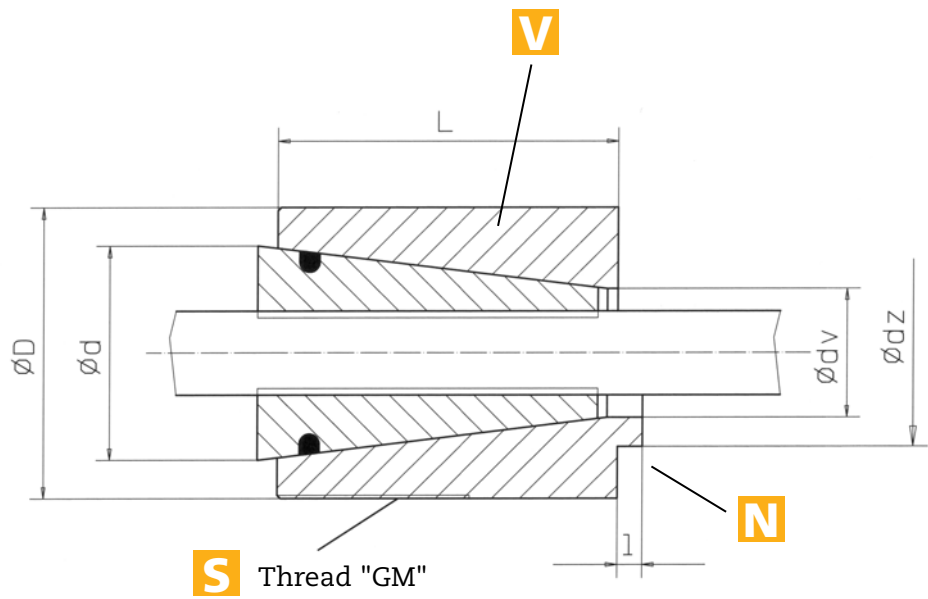
Multi-Use Pretensioning Grips

Recommendations for the choice of product

A/F/K 20.5-14, Wedge Type 14	The smallest, least expensive anchor grip, suitable for prestressing wire up to 5 (6) mm Ø. Wedges always in 2 segments.
A/F/K 24-16, Wedge Type 16	The anchor grip most frequently used for smooth or profiled cold-drawn prestressing wire up to 7 mm Ø, wedge generally in 2 segments.
Wedge Type 16 S outside dia. 17 mm	Suitable for use in A, F or K 24-16 grips, particularly recommended for use with wires from 6.5 mm upwards and with 2-wire and 3-wire strands.
Wedge Type 16 I 22	A wedge with a wedge taper of 3.5°, generally used in anchor plates with taper holes.
A/F/K 30-22, Wedge Type 22	Most frequently used for thicker prestressing wire up to 8 mm Ø and for up to 3/8" strand. Wedges mostly in 3 segments.
A/F/K 38-26, Wedge Type 26	An extremely robust anchor grip with 3-segment wedge, suitable for up to 7/16" strand.
A/F/K 38-28, Wedge Type 28	The anchor grip most frequently used in Germany for casting-bed production with 1/2" and SIG 12.0 and prestressing forces below 135 kN. Anchor wedges are available for wire from 5 mm Ø up to 0.6" strand, generally in 3 segments.
A/F/K 42-30, Wedge Type 30, F 44-30	A robust anchor grip with 3-segment wedge, chiefly used with 1/2" strand up to 13 mm Ø. Recommended anchor plate hole spacing 45 mm.
A/F/K 44-32, Wedge Type 32	A robust anchor grip with 3-segment wedge, used for high-tensile 1/2" 300K strand up to 182 kN.
A/F/K 45-34, Wedge Type 34	A robust, powerful grip with a long service life, frequently used with 0.6" strand. Type 34 wedges generally in 3 segments.
A/F/K 50-38, Wedge Type 38	An extremely robust and durable anchor grip (mostly used in the USA) for pretensioning applications involving heavy stresses with 0.6" strand. Type 38 wedges, generally in 3 segments, are available for strand up to 0.7".
A/F/K 60-42, Wedge Type 42	An anchor grip with considerable safety reserves, mainly used in testing machines and for special applications. Type 42 wedges, generally in 3 segments, are available for strands, structural steel and helically ribbed bars.

A

Open Grips





Open Grips

Pretensioning Type



1	Designation	A 20.5-14	A 24-16	A 30-22	A 38-26	A 38-28	A 42-28
2	Especially recommended mm	3-6	4-7	6-9	6-11.5	9-13	12-13
3	for prestressing steel dia. in.	1/8-1/4	0.16-0.28	1/4-3/8	1/4-7/16	3/8-1/2	1/2
4	Suitable wedge type	14	16/16 S	22	26	28	28
5	Possible wedge length mm	22	27/30	33	30-43	30-36	30-36
6	Maximum service load kN	40	55	80	130-160	110-140	130-160
7	Ultimate load kN	60	85	120	180-220	150-180	205-250
11	D mm	20.5	24	30	38	38	42
12	L mm	25	35	35	47.7	42	40
13	d mm	14.7	17.5	22	27.5	28	28.25
14	dv mm	9.3	9.2	14	16.5	18.5	18.5
17	Weight (without wedges) g	43	87	123	280	232	300
18	Package - quantity	100	100	50	30 50	30	20
18	Package - dimensions	VP8	VP8	VP8	VP8 VP9	VP8	VP8
21	Remarks						
22	Order No. (without wedges)	81-251.02	11-332.01	11-377.03	81-251.63	81-251.03	81-251.29
27	Barrel inscription	Paul A 20.5-14 40 kN	Paul A 24-16 55 kN	Paul A 30-22 80 kN	Paul 3/8-7/16 160 kN	Paul A 38-28 140 kN	Paul 160 kN A 42-28

1	Designation	A 42-30	A 44-32	A 42-34	A 45-34	A 50-34	A 50-38
2	Especially recommended mm	12-(15,8)	12-(15,8)	12-13	12-16	15,2-(18)	15,2-(18)
3	for prestressing steel dia. in.	1/2-(0,62)	1/2-(0,62)	1/2	1/2-0,62	0,6-(0,7)	0,6-0,7
4	Suitable wedge type	30	30/32	34	34	34	38
5	Possible wedge length mm	40-50	50-54	41-50	41-50	41-50	55-70
6	Maximum service load kN	160-200	160-220	140-180	160-220	200-290	270-350
7	Ultimate load kN	240-300	240-300	190-270	230-330	305-450	410-550
11	D mm	42	44	42	45	50.4	50.4
12	L mm	49	55	54	54	55	70
13	d mm	30	32	34	34	34	37.5
14	dv mm	18.5	19.5	21	21	21.5	21.5
17	Weight (without wedges) g	346	431	328	418	600	710
18	Package - quantity	20 50	20	20	16	16	10 24
18	Package - dimensions	VP8 VP9	VP8	VP8	VP8	VP8	VP8 VP9
21	Remarks						
22	Order No. (without wedges)	81-251.55	81-251.82	81-251.20	81-251.37	81-251.30	81-251.26
27	Barrel inscription	Paul 1/2 200 kN	Paul 220 kN-1/2 A 44-32	Paul 180 kN A 42-34	Paul A 45-34 220 kN	Paul 290 kN A 50-34	Paul 350 kN 0.6 or 9/16

V

Pretensioning Type

Open Grips



1	Designation		A 65-38	A 60-42	A 80-48
2	Especially recommended mm		15.2 - 18	18 - 20	9 - 18.3
3	for prestressing steel dia. in.		0.6 - 0.7	0.7 - 0.8	3/8 - 0.7
4	Suitable wedge type		38	42	48
5	Possible wedge length	mm	55 - 70	50 - 70	80 - 100
6	Maximum service load	kN	550	310 - 450	700
7	Ultimate load	kN	750	440 - 640	1100
11	D	mm	65	60	80
12	L	mm	70	75	100
13	d	mm	38	42	49.5
14	dv	mm	21.5	25	25
15	l	mm	-	-	-
16	dz	mm	-	-	-
17	Weight (without wedges)	kg	1.450	1.140	3.090
18	Package - quantity		-	-	-
18	Package - dimensions		-	-	-
21	Remarks		-	-	-
22	Order No. (without wedges)		81-255.01	81-251.27	81-251.80
27	Barrel inscription		Paul 550 kN A 65-38	Paul 450 kN A 60-42	Paul 700 kN A 80-48

N

Post-Tensioning Type

1	Designation		A 38 N-26	A 42 LN-28	A 45 N-28	A 42 N-30	A 42 N-30	A 50 N-35
2	Especially recommended mm		12 - 13	12 - 15.8	12 - 15.3	12 - 15.8	12 - 15.8	17.7-18.3
3	for prestressing steel dia. in.		1/2	1/2 - 0.62	1/2 - 0.6	1/2 - 0.62	1/2 - 0.62	0.7
4	Suitable wedge type		26	28	28	30	30	35
5	Possible wedge length	mm	30-43	30-45	30-36	45	45	55
6	Maximum service load	kN	130-170	130-230	190-240	220	220	330
7	Ultimate load	kN	180-220	205-300	240-300	300	300	400
11	D	mm	38	42	45	42	42	50.4
12	L	mm	43.7	48	40	48	48	57
13	d	mm	26.5	28	28	30.5	30.8	35
14	dv	mm	16.5	17	18.5	18.5	18.5	21.5
15	l	mm	-	-	-	2	3	-
16	dz	mm	-	-	-	21	32	-
17	Weight (without wedges)	kg	0.25	0.38	0.36	0.34	0.35	0.61
18	Package - quantity		30 50	20 50	-	20 50	20 50	12
18	Package - dimensions		VP8 VP9	VP8 VP9	-	VP8 VP9	VP8 VP9	VP8
21	Remarks		-	-	AT	-	-	-
22	Order No. (without wedges)		81-251.72	81-251.42	81-251.10	81-251.60	81-251.56	81-251.85
27	Barrel inscription		Paul 170 kN A 38N-26	Paul 230 kN A 42LN-28	Paul 240 kN A 45-28	Paul 220 kN A 42N-30	Paul 220 kN A 42N-30	Paul 330 kN A 50N-35



Open Grips

Special Grips

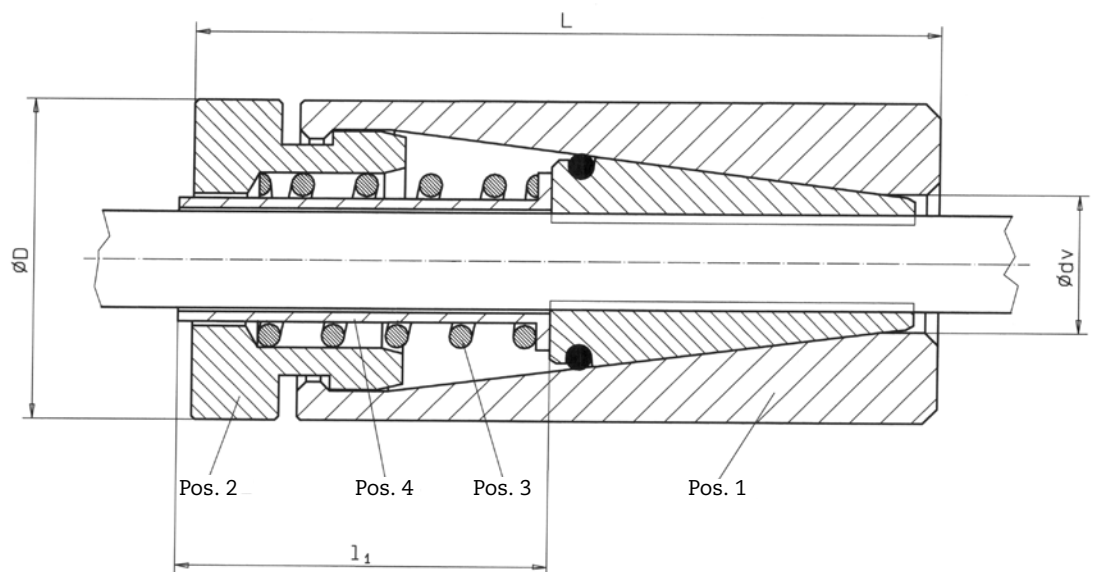


1	Designation	A 30-16 I22	A 42 L-28	A 42 L-34	A 80 - 56/10	A 110-56/10	A 100-66/10
2	Especially recommended mm for prestressing steel dia. in.	5.5-7.0 0.22-0.28	9-13 3/8-1/2	12-15.3 1/2-0.6	20-25 0.8-1	20-25 0.8-1	25-30 1-1.2
4	Suitable wedge type	16 I 22	28	34	56/10	56/10	66/10
5	Possible wedge length mm	22	30-60	41-60	58	58	79
6	Maximum service load kN	55	130-320	120-230	700	1050	1200
7	Ultimate load kN	75	205-490	200-350	1000	1600	1700
11	D mm	30	42	42	80	M 110 x 4	100
12	L mm	40	65	65	58	80	78
13	d mm	16.6	28	34	55	55	66
14	dv mm	12.4	14	18.5	36.4	36	38.5
17	Weight (without wedges) kg	0.174	0.53	0.43	1.53	4.95	3.51
18	Package - quantity						
18	Package - dimensions						
21	Remarks	AT	-	-	-	GM	-
22	Order No. (without wedges)	11-269.04	81-251.01	81-251.17	81-251.38	83-193.06	81-251.19
27	Barrel inscription	Paul 55 kN A 30-16 I 22	Paul 320 kN A 42L-28	Paul 230 kN A 42L-34	Paul 700 kN A 80-56/10	Paul 1050 kN A 110-56/10	Paul 1200 kN A 100-66/10

1	Designation	A 85-60/7	A 100-60/7	A 110-70/7	A 110-70/7	A 110-80/7	A 110-80/7
2	Especially recommended mm for prestressing steel dia. in.						
4	Suitable wedge type	60/7	60/7	70/7	70/7	80/7	80/7
5	Possible wedge length mm	75	75	80	80	100	100
6	Maximum service load kN	400	830	650	650	680	680
7	Ultimate load kN	700	1280	1170	1170	1200	1200
11	D mm	85-95	100	110	M 110 x 4	110	M 110 x 4
12	L mm	78	78	83	80	100	100
13	d mm	60	60	70	70	82.5	82.5
14	dv mm	40.8	41	49.6	50.4	59	59
17	Weight (without wedges) kg	2.55	3.6	4.6	4.1	3.8	3.74
18	Package - quantity						
18	Package - dimensions						
21	Remarks	-	-	-	GM	-	GM
22	Order No. (without wedges)	83-820.05	81-251.64	83-820.06	83-193.02	83-199.01	83-199.09
27	Barrel inscription	Paul 400 kN A 85-60/7	Paul 830 kN A 100-60/7	Paul 630 kN A 110-70/7	Paul 650 kN A 110-70/7	Paul 680 kN A 110-80/7	Paul 680 kN A 110-80/7



Enclosed Grips





Enclosed Grips

Pretensioning Type



1	Designation	F 20.5-14	F 24B-16	F 24-16	F 30B-22	F 30-22	F 38B-26
2	Especially recommended mm	3-6	4-7	4-7	6-9	6-9	6-8
3	for prestressing steel dia. in.	1/8-1/4	0.16-0.28	0.16-0.28	1/4-3/8	1/4-3/8	1/4-5/16
4	Suitable wedge type	14	16/16S	16/16S	22	22	26
5	Possible wedge length mm	22	27/30	27/30	33	33	30-43
6	Maximum service load kN	35	55	55	80	80	120-140
7	Ultimate load kN	55	85	85	120	120	160-200
11	D mm	20.5	24	24	30	30	38
12	L mm	52	58	71	65	72	76
13	l1 mm	25	26	38	30	36	-
14	dv mm	9.4	11	11	14	14	17.4
16	Thread G mm	M 18 x 1.5	-	M 20 x 1.5	-	M 26 x 1.5	-
17	Weight (without wedges) g	85	130	164	218	244	434
18	Package - quantity	100	60 100	50	30	30	25
18	Package - dimensions	VP8	VP8 VP9	VP8	VP8	VP8	VP9
21	Remarks	G	B	G	B a	G	B
22	Order No. complete (w/o wedges)	81-131.00	81-153.00	81-132.00	81-159.00	81-145.00	81-205.00
23	Order No. Barrel Pos.1	81-129.01	81-153.06	81-132.03	81-159.01	81-164.01	81-205.01
24	Order No. Cap Pos.2	81-131.02	81-153.08	81-132.02	81-159.02	81-145.02	81-204.02
25	Order No. Spring Pos.3	W 091.63	W 090.31	W 090.31	W 090.33	W 090.33	W 090.76
26	Order No. Press-in tube Pos.4	81-175.11	81-175.01	81-175.06	81-175.02	81-175.07	-
27	Barrel inscription	Paul F 20.5-14 35 kN	Paul F 24B-16 55 kN	Paul 55 kN F/K 24-16	Paul 80 kN F 30B-22	Paul 80 kN F/K 30-22	Paul 1/4-5/16 140 kN

1	Designation	F 38B-26	F 38B-28	F 38-28	F 42-28	F 42-30	F 44B-30
2	Especially recommended mm	9-11.5	9-13	9-13	12-13	12-(15.8)	12-(15.8)
3	for prestressing steel dia. in.	3/8-7/16	3/8-1/2	3/8-1/2	1/2	1/2-(0.62)	1/2-(0.62)
4	Suitable wedge type	26	28	28	28	30	30
5	Possible wedge length mm	30-43	30-36	30-36	30-36	40-50	40-50
6	Maximum service load kN	120-140	110-140	110-140	130-160	160-200	160-220
7	Ultimate load kN	160-200	150-180	150-180	205-250	240-300	240-300
11	D mm	38	38	38	42	42	44
12	L mm	76	69	83	85	99	89
13	l1 mm	-	27	43	42	42	-
14	dv mm	17.4	19	19	19	19	19
16	Thread G mm	-	-	M 32 x 2	M 36 x 2	M 36 x 2	-
17	Weight (without wedges) g	434	392	462	576	662	698
18	Package - quantity	25	25	20	10	10 25	10 25
18	Package - dimensions	VP9	VP8	VP8	VP8	VP8 VP9	VP8 VP9
21	Remarks	B	B a; b	G	G	G	B
22	Order No. complete (w/o wedges)	81-204.00	81-165.00	81-163.00	81-137.00	81-196.00	81-207.00
23	Order No. Barrel Pos.1	81-204.01	81-165.01	81-160.01	81-138.02	81-196.01	81-207.01
24	Order No. Cap Pos.2	81-204.02	81-165.02	81-163.01	81-139.02	81-139.02	81-203.02
25	Order No. Spring Pos.3	W 090.76	W 090.76	W 090.76	W 090.77	W 090.77	W 091.86
26	Order No. Press-in tube Pos.4	-	81-175.08	81-175.03	81-175.04	81-175.04	-
27	Barrel inscription	Paul 3/8- 7/16 140 kN	Paul 140 kN F 38B-28	Paul 140 kN F/K 38-28	Paul 160 kN F/K 42-28	Paul 200 kN 1/2	Paul 1/2 220 kN



Pretensioning Type

Enclosed Grips



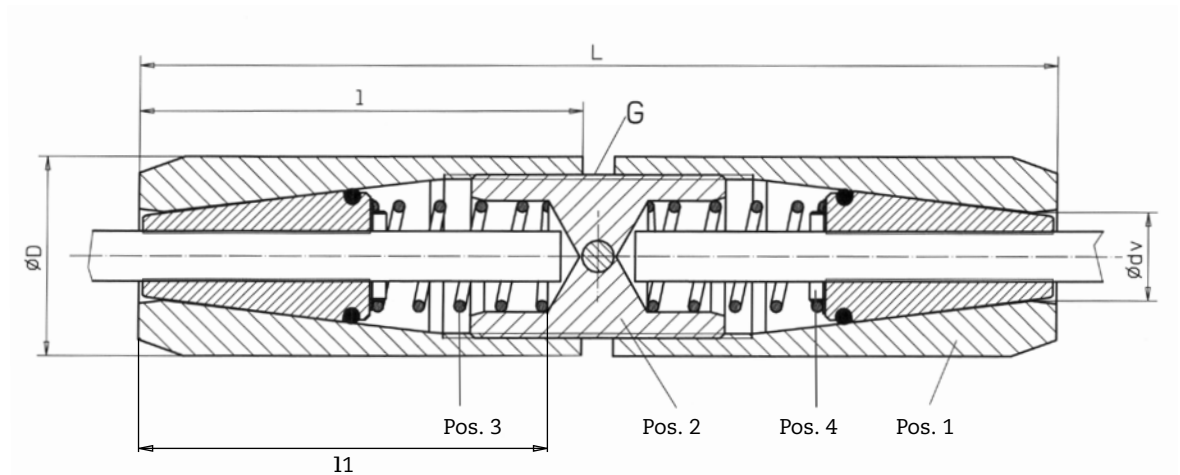
1	Designation	F 44B-32	F 42-34	F 45B-34	F 45-34	F 50-34	F 50B-38
2	Especially recommended mm	12-(15.8)	12-13	12-16	12-16	15.2-(18)	15.2-18
3	for prestressing steel dia. in.	1/2-(0.62)	1/2	1/2 - 0.63	1/2-0.63	0.6-(0.7)	0.6-0.7
4	Suitable wedge type	30/32	34	34	34	34	38
5	Possible wedge length mm	50-54	41-50	41-50	41-50	41-50	55-70
6	Maximum service load kN	160-220	140-180	160-220	160-220	200-290	270-350
7	Ultimate load kN	240-300	190-270	230-330	230-330	305-450	410-550
11	D mm	44	42	45	45	50.4	50.4
12	L mm	100	99	94	99	99	111
13	l1 mm	36	42	42	42	42	-
14	dv mm	19.5	22.5	22,5	22.5	22.5	22.5
16	Thread G mm	-	M 36 x 2	-	M 39.4 x 2	M 39.4 x 2	-
17	Weight (without wedges) g	767	586	864	728	1035	960
18	Package - quantity	20	10	10	-	-	16
18	Package - dimensions	VP9	VP8	VP8	VP8	-	VP9
21	Remarks	B	G a; b	B	G	G	B
22	Order No. complete (w/o wedges)	81-209.00	81-139.00	81-188.10	81-188.00	81-178.00	81-191.02
23	Order No. Barrel Pos.1	81-209.02	81-161.01	81-188.11	81-189.01	81-176.03	81-191.03
24	Order No. Cap Pos.2	81-209.03	81-139.02	81-188.12	81-188.01	81-178.01	81-191.04
25	Order No. Spring Pos.3	W 092.61	W 090.77	W 090.77	W 090.77	W 090.77	W 092.75
26	Order No. Press-in tube Pos.4	-	81-175.04	81-175.04	81-175.04	81-175.04	-
27	Barrel inscription	Paul 220 kN-1/2 F 44B-32	Paul 180 kN F/K 42-34	Paul 220 kN F 45B-34	Paul 220 kN F/K 45-34	Paul 290 kN F/K 50-34	Paul 350 kN 0.6 or 9/16

1	Designation	F 50-38	F 60-42
2	Especially recommended mm	15.2-18	18-20
3	for prestressing steel dia. in.	0.6-0.7	0.7-0.8
4	Suitable wedge type	38	42
5	Possible wedge length mm	55-70	50-70
6	Maximum service load kN	270-350	310-450
7	Ultimate load kN	410-550	440-640
11	D mm	50.4	60
12	L mm	120	130
13	l1 mm	45	56
14	dv mm	22.5	26.5
16	Thread G mm	M 43.4 x 2	M 48 x 2
17	Weight (without wedges) g	1100	1880
18	Package - quantity	12	-
18	Package - dimensions	VP9	-
21	Remarks	G	G
22	Order No. complete (w/o wedges)	81-191.00	81-195.00
23	Order No. Barrel Pos.1	81-190.01	81-194.01
24	Order No. Cap Pos.2	81-191.01	81-195.01
25	Order No. Spring Pos.3	W 092.75	W 091.55
26	Order No. Press-in tube Pos.4	-	81-175.10
27	Barrel inscription	Paul 350 kN 0.6 or 9/16	Paul 450 kN F/K 60-42

SPECIAL ANCHOR GRIPS	F 80-48	F 80-56/10	F 100-66/10
	9-18.3 3/8-0.7	20-25 0.8-1	25-30 1-1.2
	48	56/10	66/10
	80-100	58	79
	850	700	1200
	1300	1000	1700
	84 158 -	84 118 -	104 140 -
	27 -	36.4 -	43 -
	M 80 x 1.5 4400	M 80 x 1.5 2900	M 100 x 1.5 5200
	- -	- -	- -
	G	G	G
	81-211.10	81-211.01	81-211.15
	81-211.12 81-211.02 W 092.62 81-211.11	81-211.04 81-211.02 W 092.62 81-211.03	81-211.17 81-211.16 W 092.62 81-211.03
Paul 850 kN F 80-48	Paul 700 kN F 80-56/10	Paul 1200 kN F 100-66/10	



Couplers





Couplers

Pretensioning Type



1	Designation		K 20.5-14	K 24-16	K 30-22	K 38-26	K 38-28	K 42-30
2	Especially recommended mm		3-6	4-7	6-9	6-11.5	9-13	12-(15.8)
3	for prestressing steel dia. in.		1/8-1/4	0.16-0.28	1/4-3/8	1/4-7/16	3/8-1/2	1/2-(0.62)
4	Suitable wedge type		14	16/16S	22	26	28	30
5	Possible wedge length	mm	22	27/30	33	30-43	30-36	40-50
6	Maximum service load	kN	35	55	80	120-140	110-140	160-200
7	Ultimate load	kN	55	85	120	160-200	150-180	240-300
10	l1	mm	45	53	59	74	69	84
11	D	mm	20.5	24	30	38	38	42
12	L	mm	101	133	136	170	162	190
13	l	mm	48	64	65	80	76	90
14	dv	mm	9.4	11	14	17.4	19	19
16	Thread G	mm	M 18 x 1.5	M 20 x 1.5	M 26 x 1.5	M 32 x 2	M 32 x 2	M 36 x 2
17	Weight (without wedges)	g	165	300	470	980	880	1280
18	Package - quantity		50	20 48	12	9 14	9	5 10
18	Package - dimensions		VP8	VP8 VP9	VP8	VP8 VP9	VP8	VP8 VP9
21	Remarks		-	-	-	-	-	-
22	Order No. complete (w/o wedges)		81-129.00	81-134.00	81-164.00	81-160.15	81-160.00	81-197.00
23	Order No. Barrel	Pos.1	81-129.01	81-132.03	81-164.01	81-160.16	81-160.01	81-196.01
24	Order No. Coupling piece	Pos.2	81-129.02	81-134.01	81-164.02	81-160.02	81-160.02	81-140.01
25	Order No. Spring	Pos.3	W 091.63	W 090.31	W 090.33	W 090.76	W 090.76	W 092.41
26	Order No. Back plate	Pos.4	81-172.05	81-172.01	81-172.02	81-172.03	81-172.03	81-172.07
27	Barrel inscription		Paul F 20.5-14 35 kN	Paul 55 kN F/K 24-16	Paul 80 kN F/K 30-22	Paul 140 kN 3/8 or 7/16	Paul 140 kN F/K 38-28	Paul 200 kN 1/2

1	Designation		K 44-32	K 42-34	K 45-34	K 50-34	K 50-38	K 60-42
2	Especially recommended mm		12-(15.8)	12-13	12-16	15.2-(18)	15.2-18	18-20
3	for prestressing steel dia. in.		1/2-(0.62)	1/2	1/2-0.63	0.6-(0.7)	0.6-0,7	0.7-0.8
4	Suitable wedge type		30/32	34	34	34	38	42
5	Possible wedge length	mm	50-54	41-50	41-50	41-50	55-70	50-70
6	Maximum service load	kN	160-220	140-180	160-220	200-290	270-350	310-450
7	Ultimate load	kN	240-300	190-270	230-330	305-450	410-550	440-640
10	l1	mm	90	84	84	84	102	109
11	D	mm	44	42	45	50.4	50.4	60
12	L	mm	202	190	190	190	232	250
13	l	mm	96	90	90	90	111	120
14	dv	mm	19.5	22.5	22.5	22,5	22,5	26.5
16	Thread G	mm	M 36 x 2	M 36 x 2	M 39.4 x 2	M 39.4 x 2	M 43.4 x 2	M 48 x 2
17	Weight (without wedges)	g	1511	1130	1410	2000	2330	3730
18	Package - quantity		5	5	5	-	8	-
18	Package - dimensions		VP8	VP8	VP8	-	VP9	-
21	Remarks		-	b	-	-	-	-
22	Order No. complete (w/o wedges)		81-187.00	81-161.00	81-189.00	81-176.00	81-190.00	81-194.00
23	Order No. Barrel	Pos.1	81-187.01	81-161.01	81-189.01	81-176.03	81-190.01	81-194.01
24	Order No. Coupling piece	Pos.2	81-140.01	81-140.01	81-189.02	81-189.02	81-190.02	81-194.02
25	Order No. Spring	Pos.3	W 092.41	W 092.41	W 092.41	W 092.41	W 092.41	W 091.55
26	Order No. Back plate	Pos.4	81-172.07	81-172.07	81-172.07	81-172.07	81-172.07	81-194.03
27	Barrel inscription		Paul 220 kN-1/2 F/K 44-32	Paul 180 kN F/K 42-34	Paul 220 kN F/K 45-34	Paul 290 kN F/K 50-34	Paul 350 kN 0.6 or 9/16	Paul 450 kN F/K 60-42

N Post-Tensioning Type

Couplers 

1 Designation		K 45 N-28	K 45 N-34	K 60 N-30	K 42 N-30
2 Especially recommended mm 3 for prestressing steel dia. in.		15.2-15.8 0.6	15.2-15.8 0.6	15.2-15.8 0.6	15.2-15.8 0.6
4 Suitable wedge type		28	34	30	30
5 Possible wedge length mm		36-45	50	45	45
6 Maximum service load kN		230	240	220	220
7 Ultimate load kN		300	330	300	300
10 l1 mm		75	76	68	84
11 D mm		45	45	60.3	42
12 L mm		164	166	143	190
13 l mm		82	83	-	90
14 dv mm		17	22.2	18,5	19
16 Thread G mm		M 32 x 2	M 39.4 x 2	M 43.4 x 2	M 36 x 2
17 Weight (without wedges) g		1.5	1.2	2.1	1.28
18 Package - quantity		5	5	-	5
18 Package - dimensions		VP8	VP8	-	VP8
21 Remarks					with lubricating nipple
22 Order No. complete (w/o wedges)		81-192.00	81-198.00	81-210.00	81-197.01
23 Order No. Barrel Pos.1		81-192.01	81-198.01	81-210.01	81-196.03
24 Order No. Coupling piece Pos.2		81-160.13	81-198.02	81-210.02	81-140.03
25 Order No. Spring Pos.3		W 090.76	W 090.77	W 090.77	W 092.41
26 Order No. Back plate Pos.4		81-172.03	81-172.04	-	81-172.07
27 Barrel inscription		Paul 230 kN K 45N-28	Paul 240 kN K 45N-34	Paul 220 kN K 60N-30	Paul 220 kN K 42N-30*

* partly stamped 'Paul 200 kN 1/2'

Recommended open-end wrenches for opening the standard couplers				
Coupler	K38-28	K42-30	K45-34	K50-38
Order No. coupler	81-160.00	81-197.00	81-189.00	81-190.00
Order-No. open-end wrench	81-160.24	81-197.09	81-189.15	81-190.03
Opening	36	38	41	46

A-, F- and K-Type Anchor Grips

Line	Legend
1	<p>Designation e.g. A 80-56/10 e.g. F 24B-16* e.g. A 42LN-28</p> <p>A = Open grip B = Bayonet cap F = Enclosed grip K = Coupler L = Long (length of barrel) N = Post-Tensioning version</p> <p>1st figure Barrel diameter (80 mm; 24 mm; 42 mm) 2nd figure Type and outside dia. of wedge (56 mm; 16 mm; 28 mm) 3rd figure Wedge taper angle (e.g. 10°), only if not 7°</p> <p>* Designations in bold type: used particularly frequently</p>
2 and 3	<p>It is recommended that the anchor grips be used for the wire/strand diameters indicated here. They can, however, be used with all the sizes of wire/strand for which the associated wedge type (Line 4) indicates suitable wedges (see Table of Wedges). Use with wire/strand whose diameter is indicated in brackets () is less advisable.</p>
5	<p>Possible wedge length. The larger value indicates the maximum wedge length and the lesser value the minimum.</p>
6	<p>Maximum service load subject to the length of the wedges with multiple uses. The smaller value is related to the shorter wedge length and the greater value to the longer wedge length indicated in Line 5. Also refer to the permissible service load of the wedges used.</p> <p>The greater value for maximum service load in "kN" is punched into the barrels (see Line 27).</p> <p>If a V-Type pretensioning barrel is used as an N-Type post-tensioning barrel, then the service load may be increased by 10%.</p>
7	<p>The ultimate load must never be exceeded as this would involve a mortal hazard. The application of such excessive load could permanently deform the barrel and this could lead to failure of the anchor grip or to the barrel splitting. The smaller value is related to the shorter wedge length and the greater value to the longer wedge length indicated in Line 5.</p>
11	<p>Single-wire stressing jacks center on the diameter D of the anchor grip. Suitable head adapters should be fitted to the jacks. Caution: Barrel F20.5-14 is not suitable for stressing by means of the single-wire stressing jack. It should only be used at the detensioning end.</p>
14	<p>Where a wedge release tool is employed, this diameter is of importance. The larger the diameter of this bore, the stronger and thus more durable the wedge release tool can be. When couplers are used, it is particularly important to use a stable and effective wedge release tool.</p>

Line	Legend (continued)																																												
15 and 16	A-Type anchor grips: Centering shoulder depth and diameter																																												
16	F- and K-Type grips: Thread size of coupling piece/cap																																												
18	Package quantity and package dimensions. Orders should be for the quantity indicated or a multiple thereof.																																												
21	<p>B with bayonet cap G with screwed cap AT Discontinued type GM Can be used with Ø 132 x 170 mm screwed sleeve, order no. 83-193.01 a Barrel has a reduced inside diameter in the area of the cap. Wedges can therefore only be exchanged once the wire/strand has been removed. b Barrel has a reduced inside diameter in the area of the taper. ½" (100) and 0.62" (150) strand can therefore only be stressed with exactly suiting wedges and not with wedges designed for 1/2" (93) or 0.6" (140) strand.</p>																																												
22	Anchor grips are normally supplied without wedges. Wedges have to be ordered separately.																																												
25	Spring Pos. 3 for F 24B-16 and F 24-16 available as an alternative with an increased solid length of 15.7 mm instead of 10.5 mm: W 092.35.																																												
27	<p>Barrel inscription</p> <p>The PAUL company logo, the maximum service load and the barrel type is stamped either onto the end or side of the barrel. If Line 27 shows a three-line inscription, this will be stamped onto the large end of the barrel, a two-line inscription will be stamped onto the barrel side.</p> <table border="0" data-bbox="284 1265 1098 1422"> <tr> <td>e.g. 3-line inscription (on barrel end)</td> <td>e.g. 2-line inscription (on side of barrel)</td> </tr> <tr> <td>PAUL PAUL 140 kN</td> <td>PAUL 350 kN</td> </tr> <tr> <td>A 24-16 F 38B-28</td> <td>0.6 or 9/16</td> </tr> <tr> <td>550 kN</td> <td></td> </tr> </table> <p>On barrels that are frequently used in the USA the size of the prestressing steel (strand) to be used is stamped in instead of the barrel type, e.g. 0.6 or 9/16.</p> <p>In addition, a code indicating the year of manufacture and the batch number concerned is stamped onto the side of all barrels.</p> <p>K 04 763/2</p> <table border="0" data-bbox="284 1646 893 2011"> <tr> <td> </td> <td> </td> <td> </td> <td>Batch number</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td></td> </tr> <tr> <td> </td> <td>Year</td> <td>e.g. 04 = year of manufacture 2004</td> <td></td> </tr> <tr> <td>Month</td> <td>A - January</td> <td>G - July</td> <td></td> </tr> <tr> <td></td> <td>B - February</td> <td>H - August</td> <td></td> </tr> <tr> <td></td> <td>C - March</td> <td>I - September</td> <td></td> </tr> <tr> <td></td> <td>D - April</td> <td>K - October</td> <td></td> </tr> <tr> <td></td> <td>E - May</td> <td>L - November</td> <td></td> </tr> <tr> <td></td> <td>F - June</td> <td>M - December</td> <td></td> </tr> </table> <p><i>In the case of queries please state the date and batch number concerned!</i></p>	e.g. 3-line inscription (on barrel end)	e.g. 2-line inscription (on side of barrel)	PAUL PAUL 140 kN	PAUL 350 kN	A 24-16 F 38B-28	0.6 or 9/16	550 kN					Batch number						Year	e.g. 04 = year of manufacture 2004		Month	A - January	G - July			B - February	H - August			C - March	I - September			D - April	K - October			E - May	L - November			F - June	M - December	
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Special Couplers

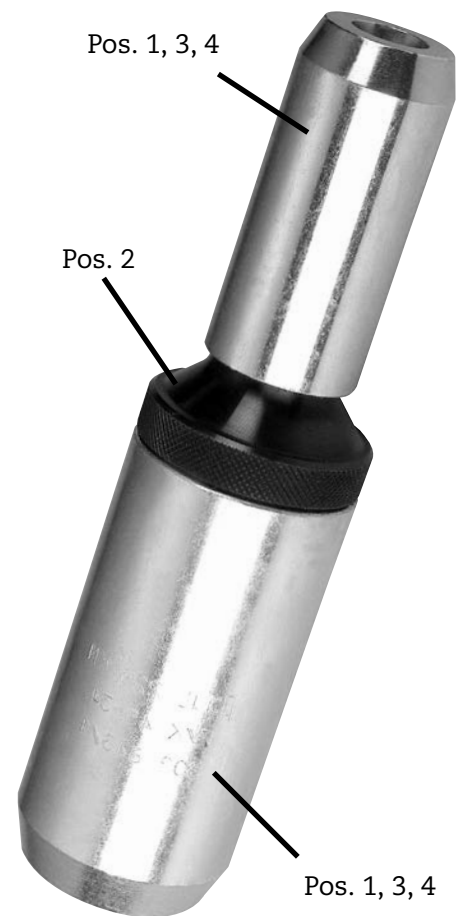
Reducing Couplers

Couplers are chiefly used as a means of saving prestressing steel. They are also used when prestressing steels of differing diameter have to be stressed in a casting bed and when the clamping range of the jack is unable to accommodate the different steel diameters.

In such cases, one half of the coupler is fitted with a length of prestressing steel that the jack can accommodate and the other half with the prestressing steel of the differing diameter that is in use.

If the difference in diameter is so great that it is not possible to use the same wedge type in both halves, then a reducing coupling piece is used to connect coupler barrels each for a different wedge type. The complete coupler then consists of the reducing piece Pos. 2 and, for each of the two wedge types, one barrel Pos. 1 with spring Pos. 3 and back plate Pos. 4. The designation of the reducing coupling piece indicates which barrel types it is capable of connecting.

Designation	Reducing Coupler complete	Order No. Pos. 2
K 50-38/ 45-34 / 50-34	81-179.00 -	81-179.01
K 50-38/ 42-30 / 42-34 / 44-32	81-181.00 - -	81-181.01
K 45-34 / 30-22 K 50-34 /	81-189.20 -	81-189.09
K 42-30 / 38-28 K 42-34 / 38-26 K 44-32 /	81-182.00 - -	81-182.01
K 42-30 / 30-22 K 42-34 / K 44-32 /	81-180.00 - -	81-180.01
K 38-28 / 30-22 K 38-26 /	81-160.10 -	81-160.18
K 38-28 / 24-16 K 38-26/	81-160.22 -	81-160.17

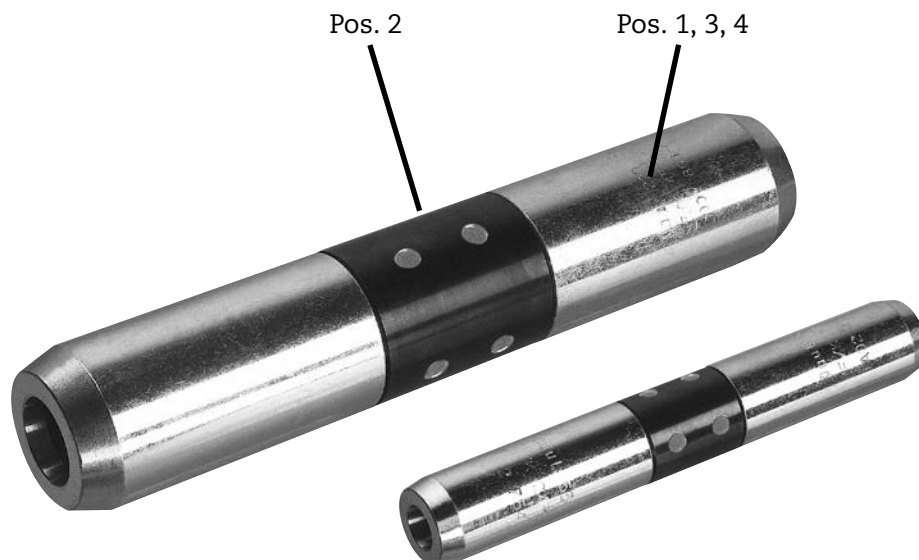


Reducing Coupler

Safety Couplers

Safety couplers are provided with cross bores through which it can be seen whether the prestressing steel is correctly inserted. The use of such coupling pieces contributes to greater safety and so their use is particularly recommended in the case of many adjacent couplers. A complete coupler then comprises a safety coupling piece Pos. 2, two barrels Pos. 1, two springs Pos. 3 and two back plates, Pos. 4.

Designation	Safety Coupler	Safety Coupling Piece Pos. 2
K 20,5-14	81-176.26	81-176.09
K 24-16	81-176.25	81-176.10
K 30-22	81-176.24	81-176.11
K 38-26 K 38-28	81-176.19	81-176.12
K 42-30 K 42-34	81-176.23	81-176.13
K 45-34	81-176.18	81-176.14
K 50-34	81-176.08	81-176.07
K 50-38	81-176.17	81-176.15



K 16-10

Inserting strands into stay cable ducts requires couplers of a small outside diameter of 16 mm that are capable of being pulled through the stay cable anchor plates by using a drawing wire. The other coupler half is fitted with the bare center wire of the strand to be inserted into the duct. The coupler wedges are designed for use with prestressing wire of 5.1 to 5.4 mm.

The pulling force should not exceed 10 to 15 kN to facilitate removing the wedges from the coupler (breaking load 33 kN).

PAUL supply couplers and associated wedge release tools as well as couplers with integrated wedge-release tools where the wedges are opened by means of a release tongs.

Coupler	Order No.	Length mm	Weight g
K 16-10	81-120.00	73	70
K 16-10 incl. release-tool	81-120.27	127	130
Wedge set	81-120.04 81-120.36 81-120.26	for wire of 5.1 to 5.4 mm dia. - strand 0.6" for wire of 5.3 to 5.5 mm dia. - strand 0.62" for wire of 4 mm dia. - strand 0.5"	

Accessories

			Weight g
One-part wedge release tool	81-120.08	for coupler 81-120.00	46
Two-part wedge release tool	81-120.09	for coupler 81-120.00	280
Wedge release tongs	81-120.28	for coupler 81-120.27	335



Coupler 81-120.00
 Coupler 81-120.27
 Wedge release tongs 81-120.28



Anchor Wedges

Prestressing steel dimensions			Wedge dimensions						Load details of prestressing steel				
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Prestressing steel types	Diameter range in mm		Order No.	No. of segments	Wedge length in mm	Tooth pitch in mm	Connection	Remark	Dimensions in mm, inches, (mm ²)	Strength R_m (f_{pk}) in N/mm ² (MPa)	Tested breaking load in kN (%)	Permissible service load in kN with multiple uses	Weight in g (approx.) per set
Type 14													
R 2.5	2.5 - 2.9		81-008.03	2	22	0.5	S1		R 2.5	1960	9.4 (95)	7.4	14
R 3	2.9 - 3.25		81-008.04	2	22	0.5	S1		R 3	1860	12.6 (94)	9.5	14
2 x 2; R 3.8	3.6 - 3.8		81-003.09	2	22	0.75	S1		2 x 2	1960	11 (89)	8	18
2 x 2.25; 3 x 2; R 4	4.0 - 4.3		81-003.02	2	22	0.75	S1		R 4 R 4 3 x 2	1860 1770 1960	23 (95) 22 (95) 16 (87)	16 16 12	18
2 x 2.4; 3 x 2.25; R 4.5	4.4 - 4.7		81-003.03	2	22	1.0	S1		R 4.5 3 x 2.25	1770 1960	28 (95) 21 (88)	20 16	17
R5	4.9 - 5.1		81-003.04	2	22	1.0	S1		R 5 R 5	1860 1770	36 (95) 34 (95)	25 25	17
3 x 2.6; 2 x 2.8 1.4"; 3 x 2.9; R 6	5.2 - 5.5 6.0 - 6.3		81-003.12 81-003.06	2 2	22 22	1.25 1.0	S1 S1		2 x 2.8 1.4" R 6	1770 1770 1670	20 (88) 36 (88) 46 (95)	15 27 35	16 15
2 x 3.5; SIG 6.2	6.3 - 6.6		81-003.31	2	22	1.5	S1		2 x 3.5	1770	30 (87)	22	14
3 x 3	6.4 - 6.7		81-003.32	2	22	1.0	S1		3 x 3	1860	36 (89)	27	14
R 7	6.9 - 7.2		81-003.07	2	22	1.0	S1		R 7	1670	62 (94)	37	13

Prestressing steel dimensions			Wedge dimensions						Load details of prestressing steel				
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Prestressing steel types	Diameter range in mm		Order No.	No. of segments	Wedge length in mm	Tooth pitch in mm	Connection	Remark	Dimensions in mm, inches, (mm ²)	Strength R _m (f _{pk}) in N/mm ² (MPa)	Tested breaking load in kN (%)	Permissible service load in kN with multiple uses	Weight in g (approx.) per set
Type 16													
R 2.5	2.5 - 2.9		81-001.10	2	27	0.5	S2		R 2.5	1960	9.5 (96)	7.4	29
R 3	2.9-3.25		81-001.01	2	27	0.5	S2		R 3	1860	13 (95)	10	29
2 x 2	3.6 - 3.8		81-001.09	2	27	0.75	S2		2 x 2	1960	11.5 (92)	9	29
2 x 2.25; 3 x 2; R 4	4.0 - 4.4		81-001.02	2	27	0.75	S2		3 x 2	1960	17 (91)	13	28
2 x 2.4; 3 x 2.25; R 4.5	4.4 - 4.7		81-001.03	2	27	1.0	S2		R 4.5	1770	28 (96)	21	27
3 x 2.25; 2 x 2.5	4.6 - 4.9		81-001.12	2	27	1.0	S2		3 x 2.25	1960	22 (91)	17	27
3 x 2.4 - 2.5; R 5	4.9 - 5.2		81-001.04	2	27	1.0	S2		R 5	1860	36 (95)	26	27
3 x 2.4 - 2.5; R 5	4.9 - 5.2		81-001.44					H	R 5 3 x 2.4(13.6)	1770 2060	34 (95) 26 (91)	26 20	27
3 x 2.6; 2 x 2.8; 3 x 2.5	5.2 - 5.5		81-001.11	2	27	1.25	S2		2 x 2.8	1770	21 (91)	16	27
2 x 3; 3 x 2.6	5.5 - 5.8		81-001.05	2	27	1.0	S2		2 x 3	1860	25 (91)	19	26
3 x 2.7	5.7 - 6.0		81-001.18	2	27	1.0	S2		3 x 2.7	1860	30 (91)	22	26
1/4"; 3 x 2.9; R 6	6.0 - 6.4		81-001.06	2	27	1.0	S2		1/4" R 6	1770 1770	38 (93) 49 (95)	28 36	25
3 x 3	6.2 - 6.5		81-001.17	2	27	1.0	S2		3 x 3	1860	37 (91)	28	25
2 x 3.5; SIG 6.2	6.3 - 6.6		81-001.14	2	27	1.5	S2		2 x 3.5	1770	31 (91)	23	24
3 x 3	6.4 - 6.7		81-001.16	2	27	1.0	S2	H	3 x 3	1860	37 (91)	28	25
L 6,85; 3 x 3,15; 3 x 3,25	6.6 - 7.0		81-001.15	2	27	1.0	S2		L 6.85(28.2)	1960	52 (92)	40	24
L 6,85; 3 x 3,15; 3 x 3,25	6.6 - 7.0		81-001.45	2	27	1.0	S2	H	L 6.85(28.2) L 6.85(28.2)	2160 2060	56 (91) 55 (92)	42 42	24
R 7	6.9 - 7.3		81-001.07	2	27	1.0	S2		R 7	1770	67 (95)	47	23
SIG 7.2; R7	6.8 - 7.4		81-001.27	3	27	1.0	S2		R 7	1670	63 (95)	47	23
5/16"; 3 x 3.5	7.4 - 7.6		81-001.08	2	27	1.0	S2		SIG 7.2 (40) 5/16" (38)	1570 1770	62 (96) 62 (90)	46 44	23
Type 16 S													
2 x 2.25; 3 x 2; R 4	4.0 - 4.4		81-001.72	2	30	0.75	S2		3 x 2	1960	18 (93)	14	32
3 x 2.4 - 2.5; R 5	4.9 - 5.2		81-001.74	2	30	1.0	S2		R 5 R 5 3 x 2.4(13.6) 3 x 2.4(13.6)	1860 1770 2160 2060	36 (95) 35 (95) 28 (92) 26 (92)	27 27 21 21	31
1/4"; 3 x 2.9; R 6	6.0 - 6.4		81-001.79	2	30	1.0	S2		1/4" R 6	1770 1770	39 (94) 49 (95)	29 37	31
3 x 3	6.4 - 6.7		81-001.76	2	30	1.0	S2		3 x 3	1860	38 (92)	29	31
L 6.85; 3 x 3.15; 3 x 3.25	6.6 - 7.0		81-001.75	2	30	1.0	S2		L 6.85(28.2)	1960	53 (93)	41	30
L 6.85; 3 x 3.15; 3 x 3.25	6.6 - 7.0		81-001.80	2	30	1.0	S2	H	L 6.85(28.2)	2060	56 (93)	43	30
R 7	6.9 - 7.3		81-001.77	2	30	1.0	S2		R 7 R 7	1770 1670	67 (95) 63 (95)	48 48	29
5/16"; 3 x 3.5	7.4 - 7.6		81-001.78	2	30	1.0	S2		5/16" (38)	1770	63 (91)	44	28
Type 16 I 22													
	6.5 - 6.7		81-014.06	2	22	1.5	-	3°30'	R 6.5	1670	50 (90)	37	21
	7.5 - 7.8		81-014.07	2	22	1.5	-	3°30'	R 7.5	1670	65 (88)	48	19

Prestressing steel dimensions			Wedge dimensions						Load details of prestressing steel				
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Prestressing steel types	Diameter range in mm		Order No.	No. of segments	Wedge length in mm	Tooth pitch in mm	Connection	Remark	Dimensions in mm, inches, (mm ²)	Strength R _m (f _{pk}) in N/mm ² (MPa)	Tested breaking load in kN (%)	Permissible service load in kN with multiple uses	Weight in g (approx.) per set
Type 22													
R 3	2.7 - 3.2		81-004.26	2	33	0.5	S 3		R 3	1860	13 (98)	10	62
2 x 2.25; 2 x 2; 3 x 2; R 4	3.9 - 4.3		81-004.27	2	33	0.75	S 3		R 4	1860	24 (98)	18	59
									R 4	1770	23 (98)	18	
3 x 2.4 - 2.5; R 5	4.9 - 5.2		81-004.22	2	33	1.0	S 3		3 x 2.4(13.6)	2060	27 (93)	21	59
3 x 2.4 - 2.5; R 5	4.9 - 5.2		81-004.30	2	33	1.0	G 9		R 5	1860	37 (96)	28	59
									R 5	1770	35 (96)	28	
R 6	5.9 - 6.2		81-004.24	2	33	1.0	S 3		R 6	1770	49 (96)	38	55
1/4"; 3 x 2.9	5.9 - 6.4		81-006.13	3	33	1.25	S 3		R 6	1670	47 (96)	38	
									1/4"	1770	39 (95)	29	54
2 x 3.5; SIG 6.2; 3 x 3	6.3 - 6.6		81-004.23	2	33	1.0	S 3		2 x 3.5	1770	32 (94)	24	55
L 6.85; 3 x 3.15; 3 x 3.25	6.6 - 7.0		81-006.19	3	33	1.0	S 3		L6.85(28.2)	1960	54 (95)	43	52
R 7; SIG 7.2	6.9 - 7.4		81-006.03	3	33	1.5	S 3		R 7	1770	67 (96)	49	
									R 7	1670	64 (96)	49	
5/16"; 3 x 3.5; R 7.5; SIG 7.5	7.4 - 7.8		81-006.04	3	33	1.5	S 3		5/16"(38)	1860	68 (94)	52	50
5/16"; R 8	7.8 - 8.3		81-006.05	3	33	1.5	S 3		R 8	1670	83 (96)	60	49
3/8"	9.2 - 9.6		81-006.06	3	33	1.0	S 3		3/8" (52)	1960	100 (95)	70	47
									3/8" (52)	1770	90 (95)	70	
SIG 10.0	10.2-10.7		81-006.09	3	33	1.5	S 3		SIG 10	1570	117 (95)	78	41
Type 26													
1/4"	5.9 - 6.4		81-007.66	3	43	1.0	G 1		1/4"	1860	42 (98)	32	107
5/16"; R 8	7.8 - 8.3		81-007.65	3	43	1.0	G 1		5/16"(38)	1860	70 (98)	54	101
									R 8	1670	84 (97)	66	
11/32" (46)	8.6 - 9.0		81-007.64	3	43	1.0	G 1		11/32"	1860	85 (98)	63	100
3/8"	9.2 - 9.6		81-007.60	3	43	1.0	G 1		3/8" (55)	1860	102 (97)	75	98
									3/8" (52)	1770	92 (97)	75	
7/16"	10.8-11.3		81-007.61	3	43	1.0	G 1		7/16"(75)	1860	139 (97)	103	90
									7/16"(70)	1860	130 (97)	103	
									7/16"(70)	1770	124 (97)	100	

Prestressing steel dimensions			Wedge dimensions						Load details of prestressing steel				
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Prestressing steel types	Diameter range in mm		Order No.	No. of segments	Wedge length in mm	Tooth pitch in mm	Connection	Remark	Dimensions in mm, inches, (mm ²)	Strength R _m (f _{pk}) in N/mm ² (MPa)	Tested breaking load in kN (%)	Permissible service load in kN with multiple uses	Weight in g (approx.) per set
Type 28													
R 5	4.9 - 5.2		81-007.29	2	30	1.0	S 4		R 5	1770	35 (96)	28	98
R 6; BST 6	5,9 - 6,2		81-007.20	3	36	1.5	S 4		R 6	1770	49 (96)	39	101
R 7; SIG 7.2	6.9 - 7.4		81-007.18	3	36	1.5	S 4		R 7	1770	67 (96)	52	105
5/16"; 3 x 3.5	7.4 - 7.8		81-007.19	3	36	1.0	S 4		5/16" (38)	1860	70 (96)	53	100
5/16"; R 8	7.8 - 8.3		81-007.01	3	36	1.5	S 4		R 8	1670	83 (96)	63	99
3/8"	9.2 - 9.7		81-007.11	3	36	1.0	S 4		3/8" (55)	1860	101 (96)	74	100
									3/8" (52)	1770	91 (96)	74	
SIG 10.0; BST 10	10.2-10.7		81-007.05	3	36	1.5	S 4		SIG 10.0	1570	122 (98)	92	91
7/16"	11.0-11.5		81-007.12	3	36	1.0	S 4		7/16" (75)	1860	138 (96)	102	90
									7/16" (70)	1860	129 (96)	102	
									7/16" (70)	1770	123 (96)	98	
R 11.9	11.7-12.3		81-007.22	3	36	1.0	S 4		R 11.9	1570	170 (97)	128	87
1/2" (93)	12.2-12.7		81-007.07	3	36	1.5	S 4		1/2" (93)	1860	164 (92)	123	85
									1/2" (93)	1770	156 (92)	123	
1/2" (93)	12.2-12.7		81-007.15	3	36	1.0	S 4		1/2" (93)	1860	167 (94)	129	87
1/2" (100)	12.5-13.2		81-007.33	3	36	1.0	S 4		1/2" (93)	1770	161 (95)	129	
									1/2" (102)	1860	183 (94)	132	82
									1/2" (100)	1770	173 (95)	132	
SIG 12.0; BST 12	12.5-13.0		81-007.08	3	36	2.0	S 4		SIG 12.0	1570	170 (96)	128	80
0.6" (140); BST 14	14.7-15.3		81-007.10	3	36	1.5	S 4		0.6"(140)	1770	235 (92)	127	70
Type 30													
3/8"	9.2 - 9.7		81-009.15	3	45	1.0	S 7		3/8" (55)	1860	102 (97)	78	134
									3/8" (52)	1960	102 (97)	78	
									3/8" (52)	1770	92 (97)	75	
7/16"	11.0-11.5		81-009.17	3	45	1.0	S 7		7/16" (75)	1860	140 (97)	105	130
									7/16" (70)	1860	130 (97)	105	
									7/16" (70)	1770	124 (97)	102	
1/2" (93)	12.2-12.7		81-009.14	3	45	1.0	S 7		1/2" (93)	1860	171 (96)	133	119
1/2" (100); 1/2" k (112)	12.5-13.2		81-009.06	3	50	1.0	G 4		1/2" (93)	1770	163 (96)	132	
									1/2" k(112)	1860	206 (96)	154	129
1/2" (100); 1/2" k (112)	12.5-13.2		81-009.16	3	50	1.0	G 4	H	1/2" (100)	1860	184 (96)	149	
									1/2" k(112)	1860	206 (96)	160	129
									1/2"(100)	1860	184 (96)	150	
Type 32													
1/2" (100); 1/2" (108)	12.7-13.4		81-052.14	3	54	1.0	G 10		1/2"(108)	2100	224 (96)	168	158

Prestressing steel dimensions			Wedge dimensions						Load details of prestressing steel				
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Prestressing steel types	Diameter range in mm		Order No.	No. of segments	Wedge length in mm	Tooth pitch in mm	Connection	Remark	Dimensions in mm, inches, (mm ²)	Strength R _m (f _{pk}) in N/mm ² (MPa)	Tested breaking load in kN (%)	Permissible service load in kN with multiple uses	Weight in g (approx.) per set
Type 34													
5/16"; BST 8 3/8"	7.9 - 8.4 9.2 - 9.7		81-027.32 81-020.04	3 3	41 41	1.5 1.0	S 8 S 9	33	5/16"(38) 3/8"(55) 3/8"(52) 3/8"(52)	1860 1860 1960 1770	70 (96) 103 (98) 103 (98) 93 (98)	52 80 80 75	170 177
3/8"	9.2 - 9.7		81-020.06	3	41	1.0	G 5		3/8"(55) 3/8"(52) 3/8"(52)	1860 1960 1770	103 (98) 103 (98) 93 (98)	80 80 75	177
7/16"; BST 10	11.0-11.5		81-020.02	3	41	1.5	S 9	32	7/16"(75) 7/16"(70) 7/16"(70)	1860 1860 1770	140 (97) 130 (97) 124 (97)	112 107 102	162
1/2" (93)	12.2-12.7		81-027.18	3	47	1.5	S 8		1/2"(93)	1860	166 (93)	133	175
1/2" (93)	12.2-12.7		81-027.15	3	47	1.0	S 8		1/2"(93) 1/2"(93)	1770 1860 1770	158 (93) 173 (97) 165 (97)	130 138 135	178
1/2" (100); 1/2" k (112)	12.5-13.2		81-027.30	3	47	1.0	S 8		1/2" k(112)	1860	208 (97)	158	175
1/2" (100); 1/2" (108)	12.7-13.4		81-027.38	3	54	1.0	G 10		1/2"(100) 1/2" (108)	1860 2100	186 (97) 224 (96)	151 168	195
SIG 12.0; BST 12 0.6" (140); 0.6" k (165); BST 14	12.5-13.0 14.7-15.3		81-027.33 81-027.16	3 3	45 47	2.0 1.0	S 8 S 8		SIG 12,0 0.6" k(165) 0.6"(140) 0.6"(140)	1570 1860 1860 1770	172 (97) 303 (96) 257 (96) 248 (97)	130 182 175 175	148 166
0.62" (150)	15.2-15.8		81-027.31	3	47	1.0	S 8		0.62"(150)	1860	276 (96)	175	162
Type 38													
L 6.85 (28.2); 7 x 2.25 1/2" (93)	6.6 - 7.0 12.2-12.7		81-030.19 81-030.04	3 3	68 68	1.0 1.0	G 6 G 6		L 6.85(28.2) 1/2"(93) 1/2"(93)	2160 1860 1770	61 (98) 175 (98) 166 (98)	50 145 138	313 302
1/2" (100); 1/2" (108)	12.7-13.4		81-030.16	3	68	1.0	G 6		1/2"(108)	2100	227 (97)	182	300
9/16" (125)	13.9-14.5		81-030.13	3	66	1.0	G 6		9/16"(125)	1860	228 (97)	187	264
0.6" (140); 0.6" k (165)	14.7-15.3		81-030.05	3	66	1.0	G 6		0.6" k(165) 0.6"(140) 0.6"(140)	1860 1860 1770	307 (97) 260 (97) 250 (98)	215 195 195	249
0.62" (150)	15.2-15.8		81-030.17	3	66	1.0	G 6		0.62"(150) 0.62"(150)	1860 1770	279 (97) 265 (97)	195 195	245
0.7" (200); 0.7" k (223)	17.7-18.3		81-030.01	3	55	1.5	G 6		0.7" k(223)	1700	367 (94)	250	234
0.7" (200); 0.7" k (223)	17.7-18.3		81-030.20	3	63	1.5	G 6		0.7"(200) 0.7" k(223) 0.7"(200)	1770 1700 1770	343 (94) 371 (95) 347 (95)	250 260 260	240

Prestressing steel dimensions			Wedge dimensions						Load details of prestressing steel				
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Prestressing steel types	Diameter range in mm		Order No.	No. of segments	Wedge length in mm	Tooth pitch in mm	Connection	Remark	Dimensions in mm, inches, (mm ²)	Strength R _m (f _{pk}) in N/mm ² (MPa)	Tested breaking load in kN (%)	Permissible service load in kN with multiple uses	Weight in g (approx.) per set
Type 42													
1/2" (93)	12.2-12.7		81-030.06	3	70	1.0	G 6		1/2"(93) 1/2"(93)	1860 1770	175 (98) 168 (99)	148 143	440
1/2" (100); 1/2"k (112)	12.5-13.2		81-030.57	3	70	1.0	G 6		1/2"k(112) 1/2"(100)	1860 1860	210 (98) 188 (98)	179 160	435
0.6" (140); 0.6"k (165)	14.7-15.3		81-030.30	3	70	1.0	G 6		0.6"k(165) 0.6"(140) 0.6"(140)	1860 1860 1770	310 (98) 263 (98) 253 (99)	290 218 215	379
0.62" (150)	15.2-15.8		81-030.58	3	70	1.0	G 6		0.62"(150) 0.62"(150)	1860 1770	282 (98) 268 (98)	225 225	335
0.7" (200); 0.7"k (223)	17.7-18.3		81-030.02	3	70	1.5	G 6		0.7"k(223) 0.7"(200)	1700 1770	379 (97) 354 (97)	280 280	
R 20; BST 19	19.8-20.8		81-030.03	3	50	4	G 6		R 20	1230	375 (97)	290	249

Prestressing steel dimensions			Wedge dimensions						Load details of prestressing steel				
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Prestressing steel types	Diameter range in mm		Order No.	No. of segments	Wedge length in mm	Tooth pitch in mm	Connection	Remark	Dimensions in mm, inches, (mm ²)	Strength R _m (f _{pk}) in N/mm ² (MPa)	Tested breaking load in kN (%)	Permissible service load in kN with multiple uses	Weight in g (approx.) per set
Type 14													
2 x 2.25; 3 x 2; R 4	4.0-4.3		81-003.26	2	22	0.75	-		R 4	1770	22 (95)	-	18
1/4"; 3 x 2.9; R 6	6.0-6.3		81-003.25	2	22	1.0	-		R 6	1670	45 (95)	-	15
Type 16													
R 4	4.0-4.4		81-001.50	2	27	0.75	-		R 4	1860	22 (95)	-	29
R 5	4.9-5.2		81-001.51	2	27	1.0	-		R 5	1860	36 (95)	-	27
R 8	7.9-8.2		81-001.37	2	23	1.0	-		R 8	1570	77 (95)	-	19
Type 22													
R 4	3.9-4.3		81-006.27	3	33	0.75	S 3		R 4	1770	23 (97)	-	46
7/16"	10.9-11.3		81-006.10	3	33	1.0	S 3		7/16" (70)	1770	120 (97)	-	35
Type 23													
1/2" (100)	12.5-13.0		81-053.01	2	33	1.0	S 13		1/2" (100)	1860	180 (97)	-	40
Type 25													
1/2" (93)	12.2-12.7		81-007.58	2	33	1.0	-		1/2" (93)	1860	169 (97)	-	56
1/2" (100)	12.5-13.0		81-007.62	3	35	1.0	S 5		1/2" (100)	1860	180 (97)	-	60
1/2" (100)	12.5-13.0		81-007.75	3	40	1.0	S 12		1/2" (100)	1860	181 (97)	-	55
1/2" (100)	12.5-13.0		81-007.69	3	41	1.0	S 12		1/2" (100)	1860	181 (97)	-	57
Type 26													
1/2" (93)	12.2-12.7		81-007.67	3	39	1.0	S 5		1/2" (93)	1860	170 (97)	-	72
1/2" (100)	12.5-13.0		81-007.68	3	40	1.0	S 5		1/2" (100)	1860	180 (97)	-	71
1/2" (100)	12.5-13.0		81-007.88	2	40	1.0	S 5		1/2" (100)	1860	180 (97)	-	75
1/2" (100)	12.5-13.0		81-034.11	3	40	1.0	S 5	P	1/2" (100)	1860	180 (97)	-	73
Type 28													
3/8" (52)	9.2-9.6		81-010.10	3	36	1.0	S 6		3/8" (52)	1860	102 (97)	-	100
1/2" (93)	12.2-12.7		81-007.27	3	36	1.0	S 6		1/2" (93)	1860	165 (94)	-	85
1/2" (100)	12.5-13.0		81-007.55	3	36	1.0	S 6		1/2" (100)	1860	175 (94)	-	84
0.6" (140)	14.7-15.3		81-007.14	3	36	1.0	S 6		0.6" (140)	1770	230 (93)	-	73
1/2" (100)	12.5-13.0		81-007.52	3	45	1.0	S 6		1/2" (100)	1860	180 (97)	-	93
0.6" (140)	14.7-15.3		81-007.50	3	45	1.0	S 6		0.6" (140)	1770	243 (97)	-	76
0.62" (150)	15.2-15.8		81-007.53	3	45	1.0	S 6		0.62"(150)	1860	272 (97)	-	73
0.62" (150)	15.2-15.8		81-007.35	3	45	1.15	S 6		0.62"(150)	1860	272 (97)	-	76
0.62" (150)	15.2-15.8		81-007.90	3	45	1.15	S 6		0.62"(150)	1860	272 (97)	-	80
0.62" (150)	15.2-15.8		81-007.91	3	45	1.15	S 6		0.62"(150)	1860	272 (97)	-	80

Prestressing steel dimensions			Wedge dimensions						Load details of prestressing steel				
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Prestressing steel types	Diameter range in mm		Order No.	No. of segments	Wedge length in mm	Tooth pitch in mm	Connection	Remark	Dimensions in mm, inches, (mm ²)	Strength R _m (f _{pk}) in N/mm ² (MPa)	Tested breaking load in kN (%)	Permissible service load in kN with multiple uses	Weight in g (approx.) per set
Type 28 Detensioning wedges													
1/2" (93)	12.2-12.7		81-035.05	3	56	1.0	S 6	E	1/2" (93)	1860	170 (97)	-	107
0.6" (140)	14.7-15.3		81-035.14	3	47	1.0	S 6	E	0.6" (140)	1770	230 (93)	-	86
0.6" (140)	14.7-15.3		81-035.03	3	56	1.0	S 6	E	0.6" (140)	1770	243 (97)	-	90
0.6" (140)	14.7-15.3		81-035.23	3	56	1.0	S 6	EH	0.6" (140)	1860	252 (97)	-	92
0.62" (150)	15.2-15.8		81-035.08	3	56	1.0	S 6	E	0.62"(150)	1770	260 (97)	-	84
0.62" (150)	15.2-15.8		81-035.28	3	56	1.0	S 6	EH	0.62"(150)	1860	272 (97)	-	85
Type 29													
1/2" (100)	12,5-13,0		81-007.80	3	42	1,0	S 6		1/2" (100)	1860	180 (97)	-	100
0,6" (140)	14,7-15,3		81-007.78	3	42	1,0	S 6		0,6" (140)	1770	243 (97)	-	87
0,6" (140)	14,7-15,3		81-007.85	2	43	1,0	-		0,6" (140)	1770	243 (97)	-	90
0,6" (140)	14,7-15,3		81-007.94	3	42	1,0	S 6		0,6" (140)	1770	243 (97)	-	86
0,6" (140)	14,7-15,3		81-007.97	2	43	1,0	-		0,6" (140)	1770	243 (97)	-	86
0,62" (150)	15,2-15,8		81-007.79	3	45	1,0	S 6		0,62"(150)	1860	272 (97)	-	87
0,62" (150)	15,2-15,8		81-007.84	2	43	1,0	-		0,62"(150)	1860	272 (97)	-	87
0,62" (150)	15,2-15,8		81-007.95	3	45	1,0	S 6		0,62"(150)	1860	272 (97)	-	84
0,62" (150)	15,2-15,8		81-007.96	2	43	1,0	-		0,62"(150)	1860	272 (97)	-	84
Type 30													
1/2" (93)	12.2-12.7		81-009.03	3	45	1.0	S 7		1/2" (93)	1860	170 (97)	-	119
0.6" (140)	14.7-15.3		81-009.02	3	45	1.0	S 7		0.6" (140)	1770	243 (97)	-	101
0.6" (140)	14.7-15.3		81-009.07	3	45	1.5	S 7		0.6" (140)	1770	238 (95)	-	100
0.62" (150)	15.2-15.8		81-009.01	3	45	1.0	S 7		0.62"(150)	1860	272 (97)	-	98
0.62" (150)	15.2-15.8		81-009.26	2	45	1.0	S 7		0.62"(150)	1860	272 (97)	-	102
0.6" (140)	14.7-15.3		81-009.22	3	45	1.0	S 7	C	0.6" (140)	1860	252 (97)	-	101
0.62" (150)	15.2-15.8		81-009.21	3	45	1.0	S 7	C	0.62"(150)	1860	272 (97)	-	100
0.6" (140)	14.7-15.3		81-034.09	3	45	1.0	S 7	P	0.6" (140)	1770	243 (97)	-	103
0.62" (150)	15.2-15.8		81-034.10	3	45	1.0	S 7	P	0.62"(150)	1860	272 (97)	-	100
0.62" (150)	15,2-15,8		81-009.11	3	45	0,5	S 7	C1	0,62"(150)	1860	272 (97)	-	100
0.62" (150)	15,2-15,8		81-009.18	3	45	0,5	S 7	C	0,62"(150)	1860	272 (97)	-	100
0.62" (150)	15,2-15,8		81-009.19	3	45	1	S 7	F	0,62"(150)	1860	272 (97)	-	100
Type 30 Detensioning wedges													
1/2" (93)	12.2-12.7		81-035.11	3	56	1.0	S 7	E	1/2" (93)	1860	170 (97)	-	132
0.6" (140)	14.7-15.3		81-035.09	3	56	1.0	S 7	E	0.6" (140)	1770	243 (97)	-	114
0.62" (150)	15.2-15.8		81-035.10	3	56	1.0	S 7	E	0.62" (150)	1770	260 (97)	-	111
Type 32													
0.62" (150)	15.2-15.8		81-007.81	3	47	1.15	S 7		0.62"(150)	1860	272 (97)	-	125

Prestressing steel dimensions			Wedge dimensions						Load details of prestressing steel				
1 Prestressing steel types	2 Diameter range in mm	3	4 Order No.	5 No. of segments	6 Wedge length in mm	7 Tooth pitch in mm	8 Connection	9 Remark	10 Dimensions in mm, inches, (mm ²)	11 Strength R_m (f_{pk}) in N/mm ² (MPa)	12 Tested breaking load in kN (%)	13 Permissible service load in kN with multiple uses	14 Weight in g (approx.) per set
Type 34													
0.6" (140)	14.7-15.3		81-027.03	3	50	1.0	S 8		0.6" (140)	1860	254 (97)	-	166
Type 34 Detensioning wedges													
1/2" (100)	12.2-13.0		81-035.16	3	60	1.0	S 8	Ei	1/2" (100)	1860	180 (97)	-	195
0.6" (140)	14.7-15.3		81-035.12	3	64	1.0	S 8	E	0.6" (140)	1860	254 (97)	-	195
0.6" (140)	14.7-15.3		81-035.01	3	60	1.5	S 8	Ei	0.6" (140)	1770	243 (97)	-	180
Type 35 suitable for A 50 - 35 barrels													
0.7" (200)	17.7-18.3		81-027.19	3	55	1.5	S 8	34	0.7" (200)	1770	345 (95)	-	163

Prestressing steel dimensions			Wedge dimensions						Load details of prestressing steel				
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Prestressing steel types	Diameter range in mm		Order No.	No. of segments	Wedge length in mm	Tooth pitch in mm	Connection	Remark	Dimensions in mm, inches, (mm ²)	Strength R _m (f _{pk}) in N/mm ² (MPa)	Tested breaking load in kN (%)	Permissible service load in kN with multiple uses	Weight in g (approx.) per set
Type 14													
R 2.5	2.5 - 2.9		81-003.10	2	22	0.5	-		R 2.5	1960	9.4 (95)	7.4	18
R 5	4.9 - 5.1		81-003.13	2	22	1.0	-	N	R 5	1770	33 (95)	-	17
2 x 3; 3 x 2.6	5.5 - 5.8		81-003.05	2	22	1.0	-		2 x 3	1860	24 (88)	18	16
L 6.85; R 7	6.8 - 7.2		81-003.15	2	22	1.0	-	N	R 7	1670	62 (94)	-	13
5/16"	7.4 - 7.6		81-003.08	2	22	1.0	-		5/16"	1770	58 (88)	40	12
Type 16													
3 x 2.25; 2 x 2.5; R 4.5	4.5 - 4.8		11-332.14	2	30	1.0	S 2		3 x 2.25	1960	21 (88)	16	27
R 6	6.0 - 6.4		81-001.13	2	27	1.5	S 2		R 6	1670	46 (95)	35	24
Type 22													
oval 30 mm ²			81-014.02	2	24	2.0	-	0	(30)	1570	43 (91)	32	37
oval 50 mm ²			81-014.04	2	24	2.0	-	0	(50)	1570	70 (89)	52	36
3 x 2.5; 2 x 2.8	5.2 - 5.5		81-004.28	2	33	1.25	S 3		2 x 2.8	1770	21 (94)	17	59
2 x 3; 3 x 2.6	5.5 - 5.8		81-004.29	2	33	1.25	S 3		2 x 3	1860	25 (94)	20	58
3/8"	9.2 - 9.6		81-006.23	3	33	1.5	S 3		3/8" (52)	1770	86 (93)	64	47
5/16"; R 8	7.8 - 8.3		81-006.24	3	33	1.5	S 3	B	R 8	1670	83 (96)	60	49
R 12.2	12.1-12.5		81-034.08	3	33	1.0	S 3	P5	R 12.2	1570	180 (97)	-	43
Type 26													
2 x 2.9	5.3 - 5.6		81-007.63	2	37	1.0	G 1		2 x 2.9	1960	25 (95)	19	91
Type 28													
7/16"	11.0-11.5		81-007.28	3	30	1.0	S 6	N	7/16"(70)	1770	118 (95)	-	79
1/2" (93)	12.2-12.7		81-007.51	3	45	1.0	S 6	N	1/2" (93)	1860	170 (97)	-	93
SIG 12.0	12.5-13.0		81-005.08	3	30	2.0	S 5		SIG 12	1570	160 (90)	110	71
7 x 4.2; SIG 12.0	12.5-13.0		81-007.17	3	37	2.0	-	S	SIG 12	1570	170 (96)	128	79
0.6" (140)	14.7-15.3		81-005.10	3	30	0.5	S 5	N	0.6" (140)	1770	218 (88)	-	66
Type 28 long, for A 42 L - 28, 81-251.01 barrels													
3/8"	9.2 - 9.6		81-005.11	3	60	1.0	S 5		3/8" (55)	1860	104 (99)	82	115

Prestressing steel dimensions			Wedge dimensions						Load details of prestressing steel				
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Prestressing steel types	Diameter range in mm		Order No.	No. of segments	Wedge length in mm	Tooth pitch in mm	Connection	Remark	Dimensions in mm, inches, (mm ²)	Strength R _m (f _{pk}) in N/mm ² (MPa)	Tested breaking load in kN (%)	Permissible service load in kN with multiple uses	Weight in g (approx.) per set
Type 30													
R 10.2; SIG 10.0 0.6" (140) 0.7" (200)	10.0-10.5 14.7-15.3 17.7-18.3		81-007.31 81-009.05 81-009.20	3 3 3	55 45 45	2.0 0.75 1.0	G 5 S 7 S 7	6°30' N; 31	R 10.2 0.6" (140) 0.7" (200)	1570 1770 1770	126 (98) 243 (97) 320 (90)	100 - -	181 104 95
Type 34													
SIG 10.0 1/2" (93) R 14; BST 13	10.2-10.7 12.2-12.7 13.7-14.2		81-020.03 81-016.02 81-027.17	3 3 3	41 60 50	1.5 1.0 1.5	S 8 S 8 S 8	32	SIG 10.0 1/2" (93) R 14	1570 1860 1770	120 (97) 172 (99) 232 (96)	90 138 174	166 200 172
0.6"E _p (140); BST 14 0.6" (140)	14.7-15.3 14.7-15.3		81-027.45 81-027.37	3 3	50 50	3.0 0.75	S 8 S 8	N; E _p F	0.6"E _p (140) 0.6" (140)	1860 1860	252 (96) 254 (97)	- -	157 164
R 16; BST 14-15 R 16.5 R 18.6; BST 16-17	15.6-16.2 16.2-16.7 17.9-18.7		81-027.02 81-016.06 81-027.13	3 3 3	41 50 41	1.5 1.0 1.5	S 8 S 8 S 8	33 N	R 16 R 16.5 R 18.6	1470 1470 1090	285 (96) 302 (96) 290 (98)	185 196 -	146 150 123
Type 38													
R 5 R 6 R 7	4.9 - 5.1 6.0 - 6.3 6.9 - 7.2		81-030.07 81-030.08 81-030.11	2 3 3	68 68 68	1.0 1.0 1.0	G 6 G 6 G 6		R 5 R 6 R 7	1860 1770 1770	37 (98) 55 (98) 69 (98)	31 42 57	355 346 337
5/16"; R 7.5 R 8.0 3/8" R 10.0	7.4 - 7.6 7.9 - 8.2 9.2 - 9.7 9.8 - 10.2		81-030.09 81-030.10 81-030.22 81-030.18	3 3 3 3	68 68 68 68	1.0 1.0 1.0 1.0	G 6 G 6 G 6 G 6		5/16" R 8 3/8" (52) R 10	1770 1670 1770 1570	65 (99) 85 (98) 93 (98) 124 (98)	55 70 75 102	335 338 332 330
1/2" Ep (100) R 20; S 20 S 19	12.5-13.2 19.8-20.8 18.8-19.8		81-030.15 81-030.12 81-030.21	3 3 3	68 55 55	2.0 0.75 0.8	G 6 G 6 G 6	N N	1/2"Ep(100) R 20 S 19	1860 1230 1960	185 (97) 378 (98) (95)	154 - -	270 200 220
Type 42													
3/8" 7/16" 1/2" (93)	9.2 - 9.7 11.0-11.5 12.2-12.7		81-030.27 81-030.28 81-030.29	3 3 3	70 70 70	0.5 0.5 0.5	G 6 G 6 G 6		3/8" (55) 7/16" (75) 1/2" (93)	1860 1860 1860	104 (99) 142 (99) 175 (98)	88 120 148	431 417 406
R 14 R 14 0.60" (140) 0.62" (150)	13.7-14.3 13.7-14.3 14.7-15.3 15.2-15.8		81-030.25 81-030.26 81-030.59 81-030.31	3 3 3 3	70 70 70 70	1.5 1.0 0.5 0.5	G 6 G 6 G 6 G 6		R 14 R 14 0.6" (140) 0.62" (150)	1570 1570 1860 1860	240 (98) 240 (98) 255 (98) 275 (98)	205 205 215 226	394 392 380 380

Prestressing steel dimensions			Wedge dimensions						Load details of prestressing steel				
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Prestressing steel types	Diameter range in mm		Order No.	No. of segments	Wedge length in mm	Tooth pitch in mm	Connection	Remark	Dimensions in mm, inches, (mm ²)	Strength R _m (f _{pk}) in N/mm ² (MPa)	Tested breaking load in kN (%)	Permissible service load in kN with multiple uses	Weight in g (approx.) per set
Type 42													
R 19; BST 18	18.5-19.5		81-030.32	3	60	2.0	G 6		R 19	1230	342 (98)	270	300
S 3/4"; R 19	18.5-19.5		81-030.61	3	60	0.8	G 6		R 19	1230	340 (97)	270	340
R 21.5	21.5-22.0		81-030.56	3	75	0.8	G 6		R 21.5	1230	425 (95)	327	346
R 22; BST 20	21.5-22.5		81-030.33	3	60	2.0	G 6		R 22	1230	445 (95)	335	266
R 23; BST 22	22.5-23.5		81-030.62	3	55	2.0	G 6		R 23	1230	485 (95)	365	240
S 1"; R 25; BST 24	24.5-25.5		81-030.60	3	60	0.8	G 6		R 25	1230	568 (94)	430	252
Type 48													
L 9.3 - 9.5	9.2 - 9.7		81-030.66	3	100	0.8	G 11		3/8" (55)	1860	104 (99)	89	816
L 13	12.5-13.2		81-030.67	3	100	0.8	G 11		1/2" (100)	1860	190 (99)	160	784
L 15.2	15.2-15.7		81-030.68	3	100	0.75	G 11		0.6" (140)	1860	265 (99)	225	748
Type 56/10													
R 20; BST 19	19.8-20.8		81-036.01	3	58	4	-		R 20	1230	380 (98)	285	552
R 20; BST 18	19.5-20.5		81-036.06	3	58	2	-		R 20	1230	380 (98)	285	574
R 21; BST 20	20.5-21.5		81-036.05	3	58	2	-		R 21	1230	420 (98)	315	542
R 23; BST 22	22.5-23.5		81-036.03	3	58	2	-		R 23	1230	500 (97)	370	538
2 x 1/2" (100)	2x12.5-13.0		81-051.02	2	58	1.0	-		2 x 1/2"(100)	1860	345 (92)	260	642
R 25; BST 23	24.3-25.5		81-036.02	3	58	4	-		R 25	1230	575 (95)	430	496
R 27; BST 25	26.3-27.5		81-036.07	3	58	2	-		R 27	1230	670 (95)	500	514
R 28; BST 26	27.3-28.5		81-036.08	3	58	2	-		R 28	1230	720 (95)	540	496
R 28 - 29; BST 26	27.8-29		81-036.04	3	58	3	-		R 28	1230	720 (95)	540	490
Type 66/10													
2 x 1/2" (100)	2x12.5-13.0		83-602.08	2	75	1.5	-		2 x 1/2"(100)	1860	348 (93)	274	1400
3 x 1/2" (100)	3x12.5-13.0		81-037.03	3	79	1.5	-		3 x 1/2"(100)	1860	520 (93)	410	1300
R 32; BST 28	31-32.5		81-037.04	3	79	4	-		R 32	1030	810 (98)	630	994
2 x 1/2" (100)	2x12.5-13.0		81-037.01	2	79	1.5	-		2 x 1/2"(100)	1860	348 (93)	274	1400
Type 60/7													
2 x 1/2" (100)	2x12.5-13.0		81-051.03	2	75	1.5	-		2 x 1/2"(100)	1860	345 (92)	270	1100
6 x R 12.2 + B 12.2; R 36	36 - 37		83-820.15	3	70	1.5	-	S	R 36	1030	1000 (95)	750	700
2 x 1/2" (105)	2x12.7-13.2		81-051.04	2	75	1.5	-		2 x 1/2"(105)	1860	359 (92)	280	1100

Prestressing steel dimensions			Wedge dimensions						Load details of prestressing steel				
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Prestressing steel types	Diameter range in mm		Order No.	No. of segments	Wedge length in mm	Tooth pitch in mm	Connection	Remark	Dimensions in mm, inches, (mm ²)	Strength R_m (f_{pk}) in N/mm ² (MPa)	Tested breaking load in kN (%)	Permissible service load in kN with multiple uses	Weight in g (approx.) per set
Type 70/7													
R 18	17.4 - 19		81-017.11	3	80	3	-						1710
R 26	25.8 - 27		81-017.04	3	80	3	-		R 26	1230	635 (97)	495	1630
R 32	32 - 33.5		81-017.03	3	80	3	-		R 32	1030	805 (97)	630	1470
8 x R 12.2 + B 20	44 - 45		83-820.16	3	75	1.5	-	S	8 x R 12.2	1570	1400 (95)	-	900
Type 80/7													
R 43 - 44	43 - 44.5		81-017.07	3	80	4	-						1730
R 51 - 52	51 - 53		81-017.06	3	80	4	-						1370
R 57 - 58	57 - 59		81-017.05	3	80	4	-						1060
5 x HWR 16 + B 14	45 - 47		81-017.02	3	100	4.5	-	S	5 x HWR16	1370	1350 (95)	-	1540
R 57	57 - 59		81-017.09		80	1	-						1146



Type 60/7; 2 x 1/2" (100)
Order No. 81-051.03

Retaining rings of steel wire

Wedge type	Ring Inside Ø x thickn. (mm)	Code No.	Wedge groove Ø x width (mm)	Order No.
14	10.5 x 0.5 b	S 1	11.8 x 1.6	81-026.10
16 / 16 S	12.5 x 0.5 b	S 2	13.8 - 14 x 1.6	81-026.01
22	16.6 x 0.7 b	S 3	18.3 x 2.2	81-026.15
23	18.5 x 1.0 b	S 13	19.5 x 1.6	81-026.18
25	18.0 x 1.0 b	S 12	20 x 3	81-026.14
26 N	20.0 x 0.9 b	S 5	21 - 22.5 x 2.3 - 3.5	81-026.07
28	21.0 x 1.0 b	S 4	23.0 x 3	81-026.09
28 N	22.0 x 1.0 v	S 6	23 x 3.0	81-026.17
30 / 32	23.0 x 1.0 v	S 7	24; 25; 27 x 3	81-026.06
34 / 35	27.0 x 1.2 v	S 8	27.3 - 29.5 x 3	81-026.08
34	25.9 x 1.2 v	S 9	26.5 - 28.0 x 2.7 - 3	81-026.11
38	30.0 x 1.2 v	S 10	30.0 x 3.8	81-026.12
42	34.0 x 1.2 v	S 11	34.5 x 3.8	81-026.13

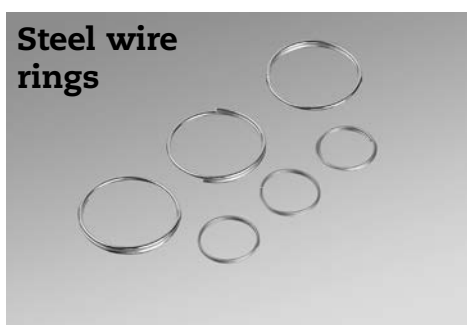
v = galvanized; b = bright steel

Rubber rings

Generally wedges are held together by means of steel wire rings but when required we can also supply rubber rings that make it easier to press the wedges onto the wire or strand.

Wedge type	Ring Inside Ø x thickn. (mm)	Code No.	Wedge groove Ø x width (mm)	Order No.
14	9.0 x 1.5	G 7	11.8 x 1.6	25-202.20
16 / 16 S	11.0 x 1.5	G 8	13.8 - 14 x 1.6	25-203.27
22	14.0 x 1.5	G 9	18.3 x 2.2	25-205.04
26	17.13 x 2.62	G 1	20.3 - 21.8 x 2.5	25-206.19
28	18 x 2	G 2	23 x 3	25-206.23
30	17.13 x 2.62	G 1	25 x 3	25-206.19
30	18.64 x 3.53	G 4	23.9 x 3.5	25-206.30
32	22 x 3.5	G 10	25 x 3.6	25-210.03
34	22 x 3	G 5	27.3 x 3	81-026.05
38	26.58 x 3.53	G 6	30 x 3.8	25-211.27
42	26.58 x 3.53	G 6	34.5 - 36.0 x 3.8	25-211.27
48	34.52 x 3.53	G 11	42 x 4	25-214.05

Packing units for steel-wire rings and rubber rings: 100, 300 and 500 rings



Anchor Wedges

Column	Legend
1 and 2	<p>Examples of prestressing steels with which the wedge can be used, their dimensions in mm and inches (values in brackets indicating their cross sectional area in mm²). Meanings:</p> <p>R 6 Plain-drawn, plain-rolled or indented solid round wire of 6 mm in diameter SIG 6.2 Ribbed (rolled and heat-treated) solid round wire, sigma steel with a nominal diameter of 6.2 mm 1/4" 7-wire strand with a nominal diameter of 1/4" 3 x 2.4 3-wire strand with a nominal single-wire diameter of 2.4 mm L 6.85 7-wire strand with a nominal diameter of 6.85 mm 1/2" k (112) 7-wire strand with a nominal diameter of 12.7 mm, compacted, 112 mm² cross section 1/2" (100) 7-wire strand with a nominal diameter of 12.7 mm, 100 mm² cross section (=0.52" (100)) BST Ribbed structural steel 420S or 500S to DIN488 Gg 26 Smooth threadable steel bar for thread rolling Gr 26.5 Helicly ribbed steel bar, nominal diameter 26.5 mm B 12.2 Blind wire with a diameter of 12.2 mm in the center of prestressing wire bundles S 20 Multi-wire cable with an outside diameter of 20 mm</p> <p>In some cases the diameter of a wire or strand may differ from the nominal diameter indicated in Column 2. In the case of ribbed steel it may be necessary to use wedges designed for the next larger diameter in place of those for the nominal diameter. In the case of 2 or 3-wire strands it is sometimes necessary to use the next smaller type. In all cases we ask that you should seek our advice when making a selection. In the case of strand with inch dimensions the actual diameter and not the nominal diameter should be used when selecting suitable wedges. A typical 1/2" strand, for example, has a diameter of 12.2 – 12.5 mm and not 12.7 mm. The cross-sectional area of the strand should also be borne in mind.</p>
5	<p>2 means a 2-segment wedge, 3 means a 3-segment wedge.</p>
7	<p>Distance between teeth Wider spaced teeth are less sensitive to dirt but for strands it is better for the teeth to be closer together.</p>
8	<p>S1 Steel retaining ring G1 Rubber ring Size 1. If specially required, wedges can be fitted with rubber retaining rings instead of steel rings and vice versa.</p>
9	<p>33 Major diameter 33 mm. Normally the type designation indicates the major diameter of the wedge (e.g. Type 28: major diameter = 28 mm). Where the major diameter differs, it is indicated here in mm. 6°30' Wedges with a 6°30' taper (as opposed to 7°15') cannot be used in standard barrels S Obliquely slit (e.g. for use with 2 – 7 wires running parallel) H High-quality = particularly high-strength material P Compression wedge for dead anchorage P5 Compression wedge for dead anchorage, taper angle 5° E Detensioning wedge, retaining groove on outside Ei Detensioning wedge, retaining groove on inside EH Detensioning wedge of high-strength material, retaining nut on outside F For low temperatures C Suitable for 2 million cycles with a stress amplitude of 200 N/mm² and a maximum load equalling 45% of breaking load C1 Suitable for 2 million cycles with a stress amplitude of 250 N/mm² and a maximum load equalling 45% of breaking load Ep For epoxy-resin coated strand N Post-tensioning version B Extended chamfer at the wedge tip for the easy insertion of prestressing steel O Oval prestressing wire</p>

Anchor Wedges

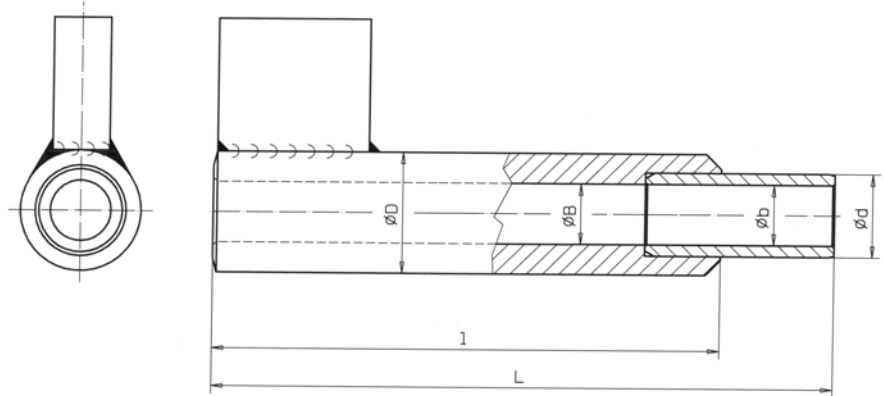
Column	Legend (continued)
10 - 13	Load details of common prestressing steels. Differing prestressing wires/strands on inquiry.
10	The wires and strands detailed in this column were tested to determine the service and breaking loads. Values in brackets (): Cross-sectional area of the tested steel in mm ² .
11	This column details the characteristic tensile strength f_{pk} (R_m) of the prestressing steels concerned. American characteristic strengths of 300K grade correspond to 2100 MPa, 270K grade strengths correspond to 1900 MPa.
12	<p>1st figure: Tested breaking load (breaking load achieved in tests) 2nd figure (in brackets): Tested breaking load as a percentage of the actual prestressing steel breaking load.</p> <p>The pretensioning wedges tested were lubricated with PAUL 350 lubricant. When using MoS₂ products the breaking load is between 2 and 5% lower than the values indicated. Post-tensioning wedges were tested without using any lubricant.</p> <p>The prestressing steels used for tests have an actual breaking strength which is max. 2 – 4% higher than their nominal breaking strength. Where the actual breaking strength of a prestressing steel is appreciably higher than the nominal value, increased notch sensibility makes itself apparent through the tested breaking load (1st figure) not increasing in the same relationship to the actual breaking strength and also by a reduction in the percentage tested breaking load. In special cases these values must be determined by tests.</p>
13	This column indicates the permissible service load in kN for multi-use (pretensioning) wedges with the prestressing steels listed in Columns 10 – 11. The values shown allow for a long service life. If the service load is increased, so the service life decreases accordingly. In practice the service load may be increased by up to a maximum of 15% above the permissible service load indicated but must not exceed 85% of the breaking load (Column 12). The permissible service load for post-tensioning wedges is that indicated in the Technical Approval of the post-tensioning system concerned. It is generally between 60 and 90% of the value indicated in Column 12.



Tools / Accessories

Drive-in Tubes for A-Type (Open) Grips

Drive-in tubes facilitate applying the wedges of A-type grips onto the prestressing steel without risk of injury and firmly enough to avoid risk of the wedges being released unintentionally.



Bodies

D	B	d	L	l	Weight g	Order No.
32	16	22	250	220	1150	10-761.42
36	18	30	250	220	1500	10-761.86

Inserts

Wire / strand	Suitable body	b	d	Weight g	Order No.
5.5 mm	10-761.42	6	22	125	10-761.41
7.5 mm	10-761.42	8	22	115	10-761.38
5/16" + 3/8"	10-761.42	10.5	22	110	10-761.39
7/16" + 1/2"	10-761.42	16.0	22	90	10-761.40
0.6"	10-761.86	18.0	30	170	10-761.93

Wedge Release Tools

The wedge release tool consisting of a body and an insert facilitates removing the prestressing steel from couplers and enclosed anchor grips.

Wedges are released either with manual force or with the aid of a hammer.

It should be remembered that wedges can only be released satisfactorily if the tapers of wedges and barrels are properly cleaned and are coated with lubricant (see „Cleaning and maintenance“).

Where strands are used cement water can run along the core wire in the center of the strand and thus enter the coupler and make it extremely difficult to release the wedges. In such a case, cut the strand off about 1 – 2 cm from the end of the barrel, screw the barrel off the coupling, and then press out the wedges together with the short length of strand.

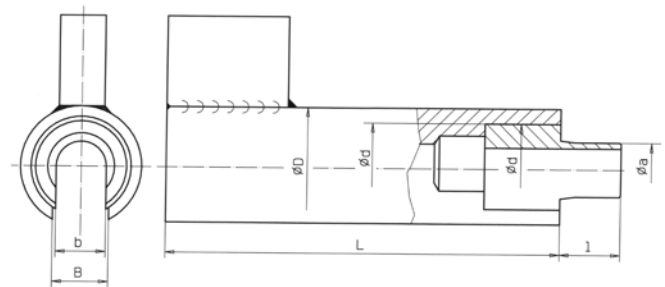
We also offer hydraulic wedge-releasing devices for the releasing of anchor grips.



Wedge release tool

Bodies

D	B	L	d	Weight g	Order No.
30	13.0	150	22	560	81-158.01
40	14.0	150	30	1120	81-157.01
40	16.5	150	30	1100	81-158.06
40	19.0	150	30	1080	81-158.07



Inserts

Wire / strand	Suitable body	a	b	d	I	To suit	Type	Weight g	Order No.
R 5	81-158.01	9.0	5.5	22	17	A/F/K 20.5/24 - 14/16	B	64	81-301.01
R 6	81-158.01	9.0	6.5	22	17	A/F/K 20.5/24 - 14/16	A	60	81-301.02
R 5	81-158.01	10.8	5.5	22	17	F/K 24 - 16	C	65	81-302.03
3 x 3	81-158.01	10.8	6.5	22	17	F/K 24 - 16	B	60	81-302.04
3 x 3.25	81-158.01	10.8	7.0	22	17	F/K 24 - 16	B	56	81-302.11
5/16"	81-158.01	10.8	8.0	22	17	F/K 24 - 16	A	54	81-302.05
R 7	81-158.01	13.6	7.5	22	21	A/F/K 30 - 22	B	73	81-303.02
R 8	81-158.01	13.6	8.5	22	21	A/F/K 30 - 22	B	65	81-304.01
3/8"	81-158.01	13.6	9.8	22	21	A/F/K 30 - 22	A	57	81-304.02
R 9.5	81-158.01	13.6	10.5	22	21	A/F/K 30 - 22	A	50	81-304.03
7/16"	81-158.01	13.6	11.5	22	21	A/F/K 30 - 22	A	42	81-305.01
7/16"	81-157.01	16.8	11.5	30	25	F/K 38 - 26	B	110	81-306.10
0.52"	81-157.01	18.0	14.0	30	20	A 38/42/44-28/30/32	B	72	81-307.03
R 8	81-157.01	18.5	8.5	30	25	F/K 38/42/44-28/30/32	C	140	81-305.03
3/8"	81-157.01	18.5	10.0	30	25	F/K 38/42/44-28/30/32	C	120	81-306.01
7/16"	81-157.01	18.5	11.5	30	25	F/K 38/42/44-28/30/32	B	100	81-306.02
0.52"	81-157.01	18.5	14.0	30	25	F/K 38/42/44-28/30/32	B	73	81-307.01
0.62"	81-158.06	20.5	16.0	30	30	A 42/45/50-34/38	A	110	81-309.08
0.52"	81-157.01	20.5	14.0	30	20	A 42/45/50-34/38	B	100	81-309.07
7/16"	81-157.01	22.0	11.5	30	30	F/K 42/45/50-34/38	C	130	81-308.03
0.52"	81-157.01	22.0	14.0	30	30	F/K 42/45/50-34/38	B	120	81-309.02
0.62"	81-158.06	22.0	16.0	30	30	F/K 42/45/50-34/38	B	110	81-309.01
0.7"	81-158.07	22.0	19.0	30	30	F/K 50 - 38	A	100	81-309.05

A Weaker type

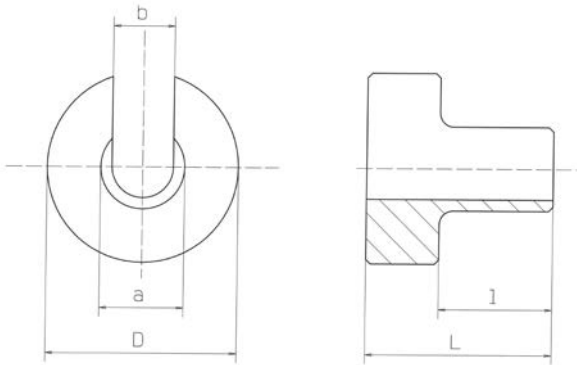
B Stronger type

C Strong type

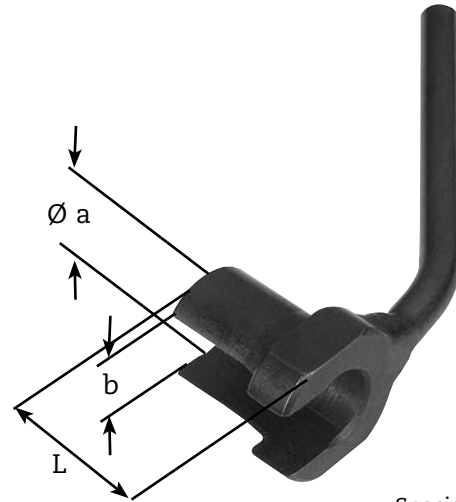
One-Piece Wedge Release Tool

a	b	D	l	L	To suit	Type	Weight g	Order No.
18.5	14.0	42	25	42	F/K 38/42/44-28/30	B	146	81-306.20
16.8	11.5	42	25	41	F/K 38 - 26	A	152	81-306.21

- A Weaker type
- B Stronger type



Scheme of one-piece wedge release tool



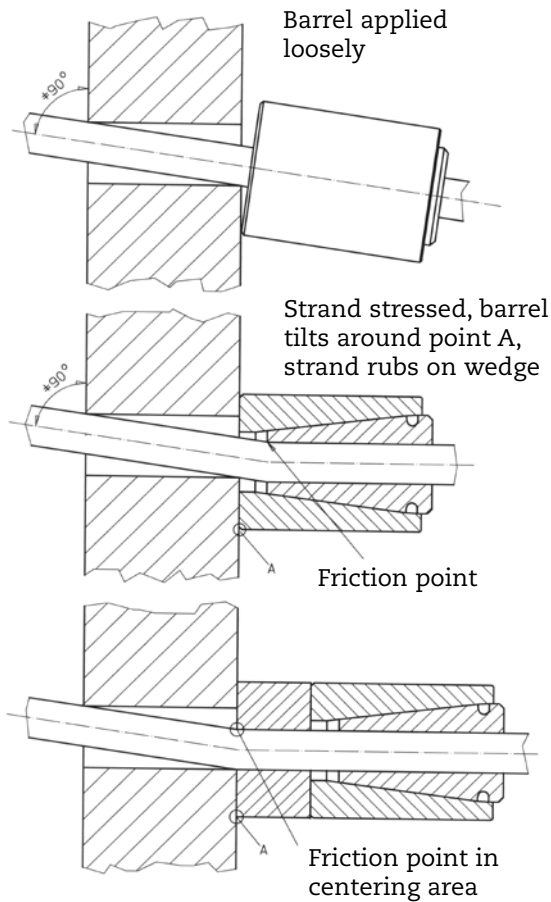
Special release tool

Special Wedge Release Tool for F-Type Grips

Our special wedge release tools can be used to release cut-off prestressing wires from F-Type anchor grips and also for detensioning an already stressing wire/strand before the concrete is cast.

Grip type	Wire/strand Ø in mm	Slot width in mm b	Slot length in mm L	Ø a	Weight g	Order No.
F 20.5 - 14	2.5 - 5.0	5.5	27	9.0	58	81-301.04
	4.0 - 6.0	6.5	27	9.0	56	81-301.05
F 24 - 16	2.5 - 5.0	5.5	27	10.8	65	81-302.06
	4.0 - 6.0	6.5	27	10.8	60	81-302.07
	5.5 - 7.5	8.0	27	10.8	54	81-302.08
F 30 - 22	5.0 - 7.0	7.5	31	13.6	48	81-304.04
	6.5 - 8.0	8.5	31	13.6	65	81-304.05
	8.0 - 9.2	9.5	31	13.6	57	81-304.06
	9.0 - 10.0	10.5	31	13.6	50	81-304.07
	9.2 - 11.1	11.5	31	13.6	42	81-304.08
F 38/42/44 - 28/30/32	7.0 - 8.0	8.5	30	18.75	140	81-306.03
	7.5 - 9.5	10.0	30	18.75	120	81-306.04
	9.0 - 11.0	11.5	30	18.75	100	81-306.05
	10.0 - 13.0	14.0	35	18.75	73	81-306.06
F 42/45/50 - 34/38	9.0 - 11.2	11.5	33	22.0	98	81-308.05
	10.0 - 13.0	14.0	33	22.0	125	81-309.04
	13.0 - 15.3	16.0	33	22.0	105	81-309.03
	15.3 - 18.5	19.0	37	22.0	95	81-309.06

Centering Pieces



Particularly in the production of precast prestressed concrete elements by the sliding mould method, prestressing wires/strands are required to be deflected when it may happen that they are no longer square to the anchor plate. This would result in the wires/strands being deflected in the area of the wedge tip and getting damaged during stressing. Abraded prestressing steel chips may prevent the proper anchoring of the steel. Small diameter prestressing steels may get between two wedge segments.

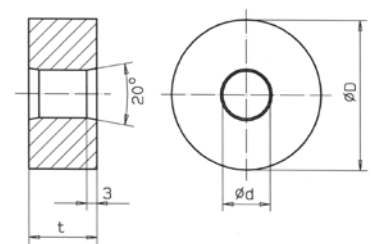
In both cases there is a risk of the prestressing steel slipping and this could lead to fatal injury of the operating personnel.

Centering pieces which should be provided with as small a bore as possible will absorb the steel deflection so that the wedge becomes free during stressing. Centering pieces of type A, without centering nose, are generally sufficient. Type B is more efficient, but also more expensive.

A/-Type grips	Wire/strand Ø mm	d mm	D mm	t mm	Shape	Order No.
20.5 - 24	5	6	20.5	20	A	81-200.71
20.5 - 24	6	7	20.5	20	A	81-200.72
20.5 - 24	7	8	20.5	20	A	81-200.73
20,5	4	5	20	20	B	81-200.51
20,5	5	6	20	20	B	81-200.52
30 - 38	L 6.85	7.5	30	25	A	81-200.74
30 - 38	7	8	30	25	A	81-200.75
30 - 38	L 5/16"	9	30	25	A	81-200.76
30 - 38	L 3/8"	10	30	25	A	81-200.77
30 - 38	10	11	30	25	A	81-200.78
30 - 38	L 7/16"	12	30	25	A	81-200.79
30 - 38	L 1/2", 12	13	30	25	A	81-200.80
30	8,9	10	30	20	B	81-200.60
42 - 50 (60)	L 3/8"	10	42	30	A	81-200.81
42 - 50 (60)	L 7/16"	12	42	30	A	81-200.82
42 - 50 (60)	L 1/2", 12	13	42	30	A	81-200.83
42 - 50 (60)	L 0.6"	16.2	42	30	A	81-200.84
45	12.7	14	40	20	B	81-200.70

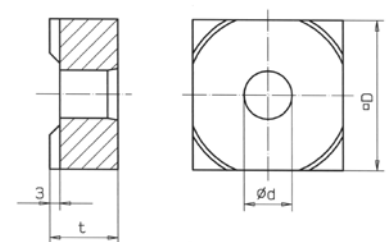
L = Strand

Shape A



heat-treated to 40-45 HRc

Shape B



heat-treated to 60-62 HRc

Detensioning Wedges

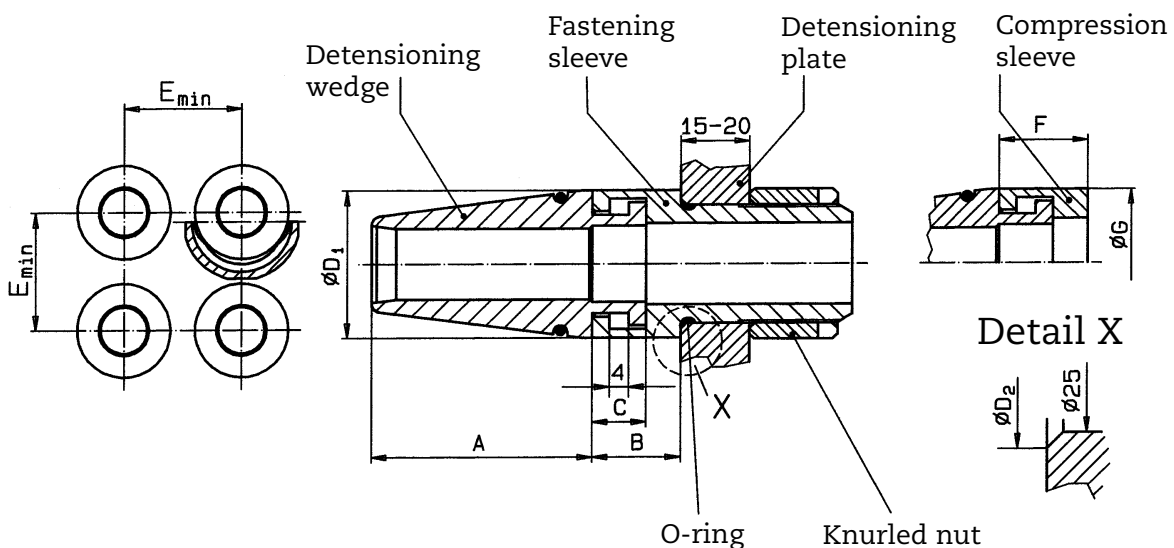
Our detensioning wedges are used – in conjunction with special retaining devices – for detensioning single or multi-strand tendons either partly or completely. To do so, the detensioning wedges are screwed onto the detensioning plate by means of two-part fastening sleeves. The detensioning plate is held back in the stressing jack or in the stool applied to the stressing jack.

If it is not required to release the tension immediately after stressing but only some time later then simple compression sleeves can be used as an alternative to the fastening sleeves as a means of protecting the hold-back lugs on the detensioning wedges.

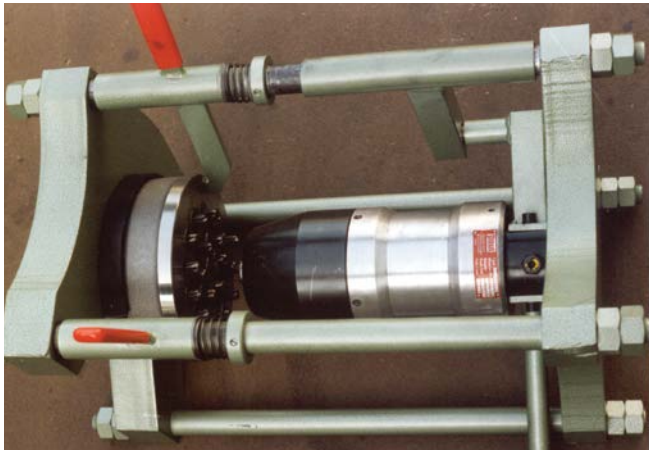
Detensioning wedges are designated by an "E" in Column 9 of the anchor wedge tables.

Wedge type	Order No.		Replacement O-rings		Dimensions					
	Fastening sleeve incl. O-ring	Knurled nut	Dimensions in mm	Order No.	A	B	C	D1	D2	E
28	81-035.04	W 110.40	Ø 20.35 x 1.78	25-207.12	45	18	11	31	27	32
30	81-035.04	W 110.40	Ø 20.35 x 1.78	25-207.12	45	18	11	31	27	32
34	81-035.13	W 110.40	Ø 22 x 2.0	25-210.04	50	21	14	34.5	29.5	36

Wedge type	Order No.		Replacement O-rings		Dimensions					
	Compression sleeve incl. O-ring		Dimensions in mm	Order No.	F	G				
28	81-035.15		Ø 27 x 2.5	25-212.03	20	32				
30	81-035.15		Ø 27 x 2.5	25-212.03	20	32				



Compression Wedges for Dead Anchorages



Wedging device 300 kN 70-063.00



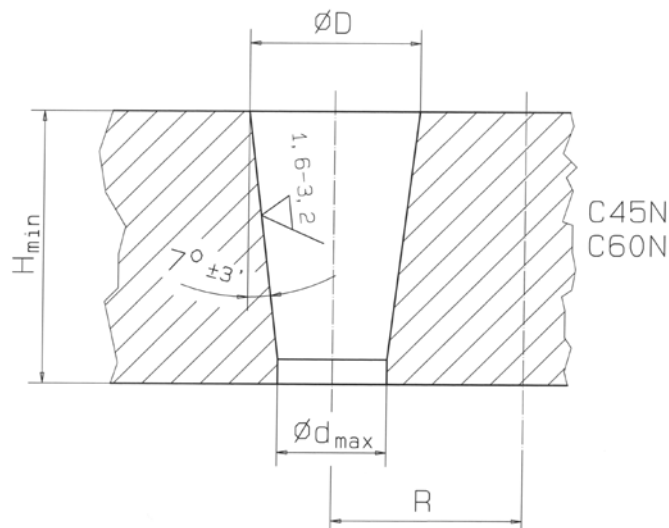
Anchor plate with compression wedges

Specially profiled compression wedges are pressed into the anchor plate with a pressure of around 1.5 times the service load. No wedge securing plate is then needed. PAUL patent DE 35 36926 A1.

Compression wedges are designated by a "P" in Column 9 of the anchor wedge tables.

Dimensions of taper bore in anchor plate (in mm)

Type	14	16/16S	22	25	26	28	29	30	34	35
D + 0,2	14.0	16.0	22.0	25.0	26.0	28.0	29.0	30.0	34.0	35.0
d max+0,2	9.5	10.0	14.0	16.0	16.0	17.0	17.5	19.0	21.5	22.0
H min	20	30-35	35-40	40	40-45	40-45	45	45-50	50	55
R	20	20	25	28	29	31-32	32-33	33-34	37-38	39-40



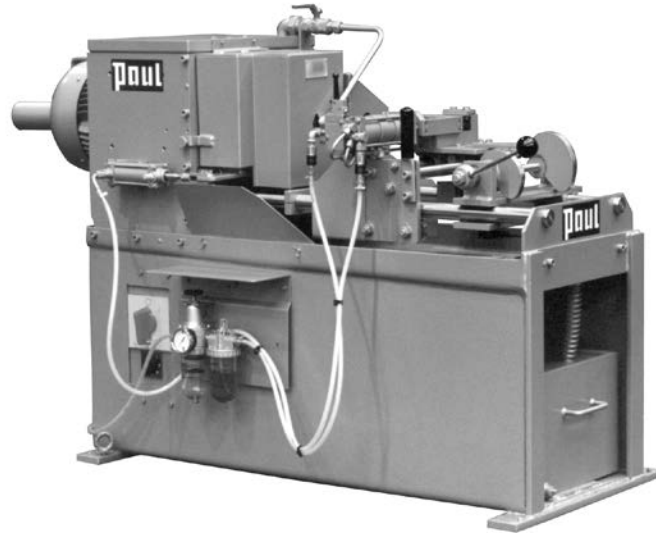
Other Special Anchors

Threaded Anchors (TENSA SS)

Threaded anchors are designed for the slip-free anchoring in the production of railway sleepers, poles, pipes, etc.

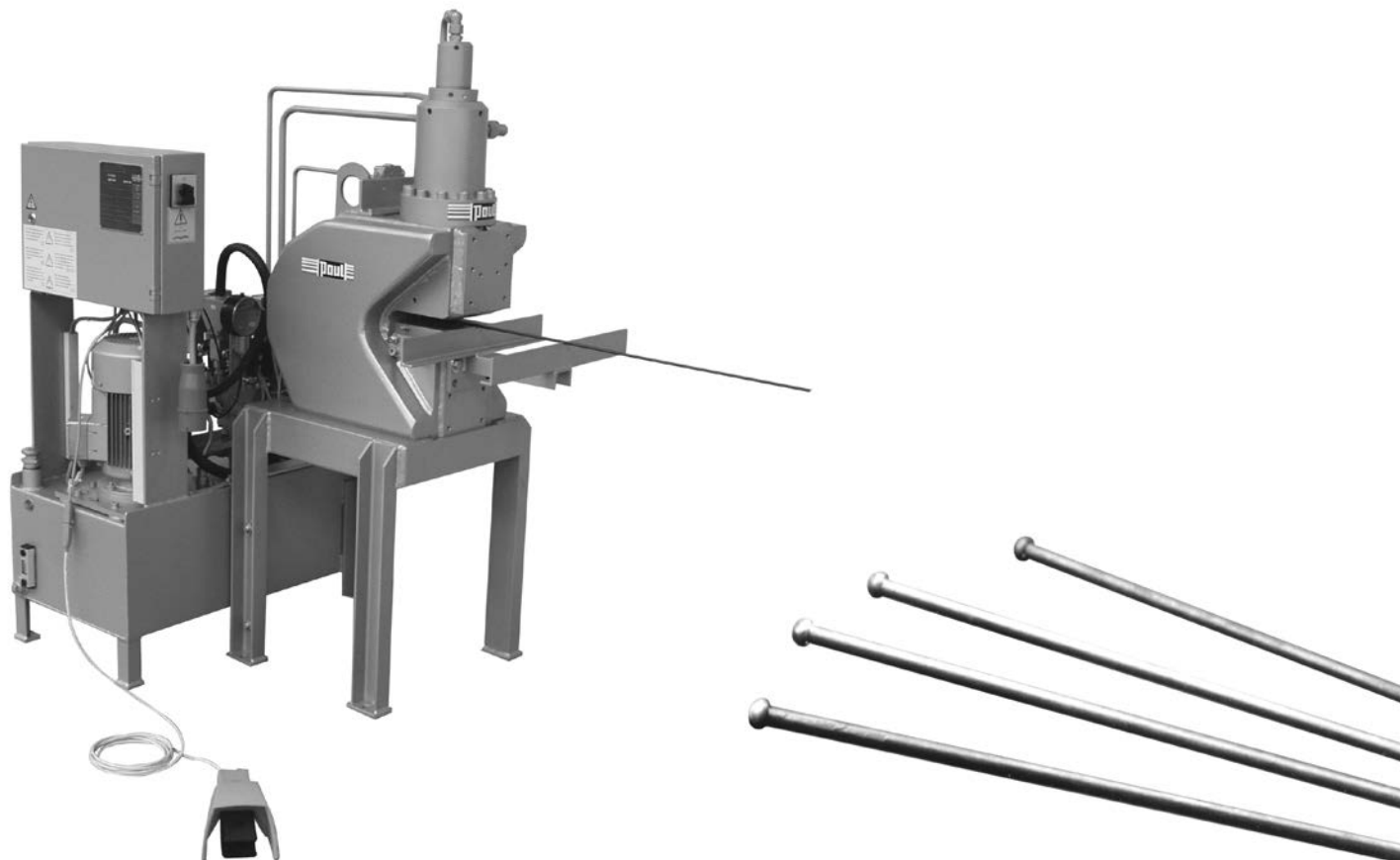
Included in our range are:

- Thread rolling machines (photo on the right)
- Stressing spindles
- Nuts
- Automatic prestressing steel cutting-off machines



Button Heading Machines and Systems

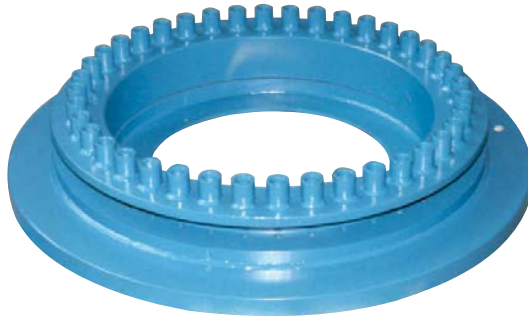
Particularly in the production of railway sleepers use is made of prestressing wires provided with button heads. For such applications we supply both stand-alone button heading machines and complete CNC-controlled systems for automatic button heading.



Anchor Heads for use in the construction of spun concrete

The front ends of the moulds used for the construction of spun concrete poles are in the form of anchor heads which are placed onto the bottom half of the mould. Then the spiral and prestressing reinforcement is inserted and lightly stressed. When the concrete has been poured in, the second half of the mould is fitted, the mould is closed, the final stressing force applied and then the mould is spun.

We supply anchor heads in all sizes on inquiry.



Wedge Anchor Plates

Wedge plates are provided with a multitude of taper holes to accommodate the anchor wedges. They are made of hardened steel and are available on inquiry for all wedge types and in all dimensions. The advantage of these plates is that they enable prestressing steels to be placed closer together and so they are particularly useful for applications where the use of individual barrels would necessitate a wider spacing than was desired.

Please note that if any one taper hole should be damaged, the entire plate is generally beyond repair.

Distance between wedges and thickness of anchor plates in mm

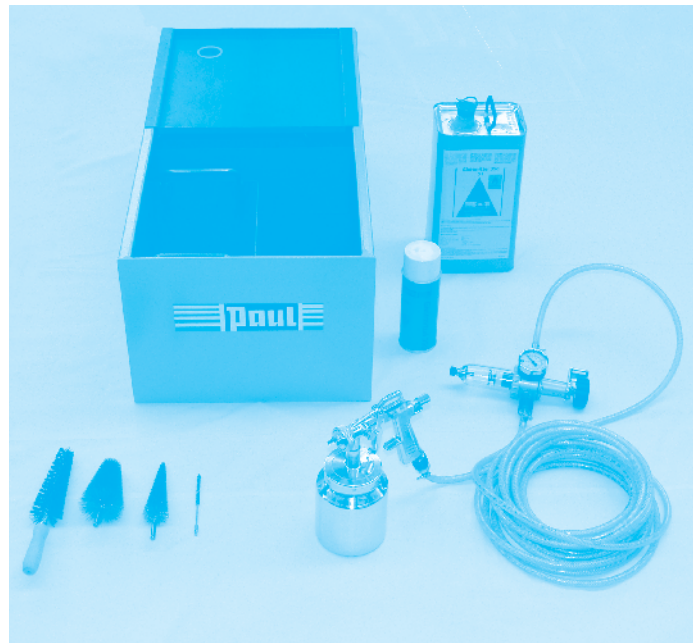
Wedge type	14	16	22	28	34	38
Min. distance	20	20	25	30,5	36	41
Normal distance	20	20	26	32-35	37.5-42	43-48
Normal thickness	25	30-35	35-40	35-40	50	50-70

Clamping Jaws

We supply clamping jaws of special steel, both to our own design and to customers' drawings, for stressing jacks, testing machines, hoisting devices and climbing framework etc.



We offer a wide range of cleaning devices, maintenance products and lubricants, etc. for the cleaning and servicing of anchor grips (see brochure "Cleaning Agents, Preservative Agents, Spraying Equipment").



Cleaning and maintenance



Packing

Packing

Packing unit	Outside Dimensions L x W x H (mm)	Designation	Weight g	Order No.
Polystyrene box	250 x 250 x 30	VP 3	30	28-060.00
	250 x 250 x 41	VP 4	38	28-060.01
	250 x 250 x 41	VP 5	42	28-060.02
	250 x 250 x 42	VP 6	36	28-060.03
	250 x 250 x 48	VP 7	58	28-060.04
Carton, light	225 x 120 x 90	VP 8	156	28-060.29
Carton, heavy (USA)	240 x 245 x 135	VP 9	490	28-060.08
Plastic bag, small	110 x 180	VP 1	4	
Plastic bag, large	136 x 220	VP 2	6	
Plastic bucket	Ø 235 x 125	VP 10	200	28-060.06
Carton pallet, small	520 x 520 x 450*	VP 11	8 kg	28-060.13
Carton pallet, medium	520 x 520 x 650*	VP 12	9 kg	28-060.14
Carton pallet, large	770 x 520 x 650*	VP 13	12 kg	28-060.15
Seaworthy case	1420 x 900 x 900	VP 14	100 kg	28-060.23

*incl. pallet, height 150 mm

A 'VP 11' pallet carries	24 cartons	VP 8
or	8 buckets	VP 10
or	4 x n boxes	VP 3 - VP 7
(n is the number of polystyrene boxes that can be stacked one above the other without exceeding a total height H of 300 mm, allow for 40 mm for height of top cover) e.g. on VP 7 $n = \frac{300 - 40}{48} = 5.4$ (with n = 5)		
A 'VP 12' pallet carries	40 cartons	VP 8
or	16 buckets	VP 10
or	4 x n boxes	VP 3 - VP 7
(n is the number of polystyrene boxes that can be stacked one above the other without exceeding a total height H of 500 mm, allow for 40 mm for height of top cover) e.g. on VP 4 $n = \frac{500 - 40}{41} = 11.2$ (with n = 11)		
A 'VP 13' pallet carries	68 cartons	VP 8
or	24 buckets	VP 10
or	6 x n boxes	VP 3 - VP 7
(n is the number of polystyrene boxes that can be stacked one above the other without exceeding a total height H of 500 mm, allow for 40 mm for height of top cover)		

Quantities of anchor wedges per package

Pretensioning

Type	Package	Qty.
14	VP 3	100
16/16 S	VP 4	100
22	VP 5	50
28 x 36	VP 6	50
34 x 45 - 47	VP 7	25
26 x 43	VP 8	100
30 x 45	VP 8	70
30 x 50	VP 8	60
34 x 45-50	VP 8	50
38 x 66-70	VP 8	36
alternatively		
26 x 43	VP 9	200
30 x 50	VP 9	140
38 x 66-70	VP 9	70

Post-tensioning

Type	Package	Qty.
14	VP 1	100
16	VP 2	100
25 x 33	VP 10	200
26 x 40	VP 10	150
28 x 36	VP 10	125
28 x 45	VP 10	125
28 x 45 E	VP 10	100
29 x 42-45	VP 10	100
30 x 45	VP 10	100
30 x 45 P	VP 10	100
30 x 45 E	VP 10	70
34 x 50	VP 10	70
34 x 50 E	VP 10	70
35 x 55	VP 10	50

For the quantities of A-, F-, and K-Type anchor grips, see Tables of A-, F-, and K-Type anchor grips

