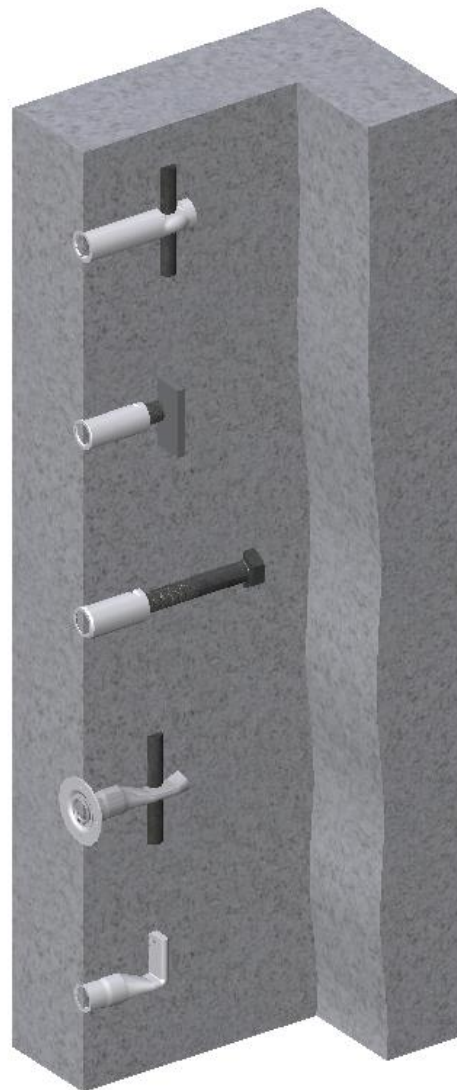



## TECHNICAL DOCUMENTATION



## FIXING SYSTEMS | **FIXING INSERTS**



OVERVIEW

FIXING SYSTEMS			
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## INTRODUCTION

Fixing systems are used in the precast industry and are suitable for installation of precast concrete elements on site. Some of the advantages of this system include:

- a wide range of fixing sockets
- capability of establishing a connection in a safe, simple manner

Fixing insert designs and technical instructions are designed according to CEN/TS 1992-4:2009 (design of fastenings for use in concrete).

## PRODUCT RANGE

### FIXING SYSTEMS

- **FIXING INSERTS**
  - Fixing socket embedded in precast concrete unit.
  - Ready for mounting bolts.
- **CONNECTING ELEMENTS AND FIXING ACCESSORIES**
  - Thread connections
  - Fixing Accessories

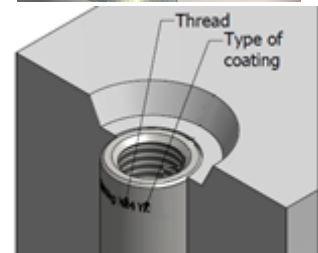
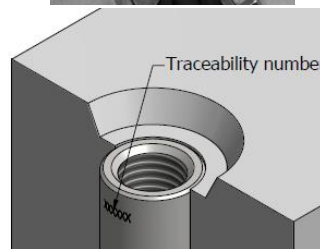
### Quality

Terwa continuously controls the fixing insert production process from the perspective of strength, dimensional and material quality, and performs all of the required inspections for a superior quality system. All of the products are tracked from material acquisition to the final, ready to use product.



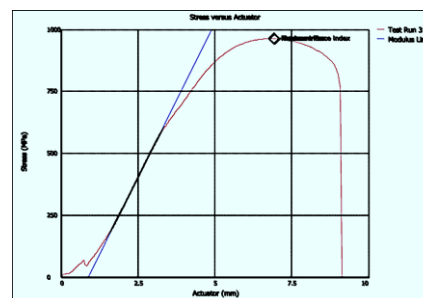
### Marking and traceability

All inserts are marked with data necessary for traceability, thread diameter and type of coating or material.



### Anchor testing

Terwa ensures that all the fixing anchors and inserts comply with the admissible design loads.



## FIXING INSERTS

### TECHNICAL CONSIDERATIONS

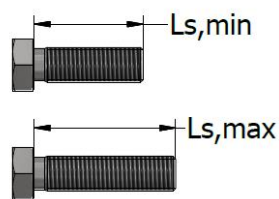
#### GENERAL GUIDANCE FOR FIXING INSERTS

The fixing inserts are easy, economical systems used for assembling concrete precast units.

#### Bolt length

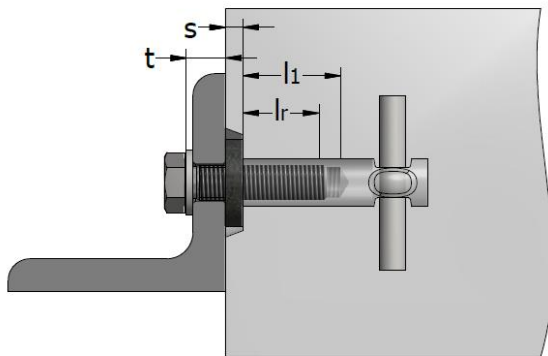
The bolt should be of sufficient length to ensure a minimum thread engagement of 1.5 times the bolt diameter.

Thread	Required thread engagement $l_r$ mm
M8	12
M10	15
M12	18
M16	24
M20	30
M24	36



$$L_{s,max} = l_1 + s + t$$

$$L_{s,min} = l_r + s + t$$



$l_1$  – thread depth of the insert  
 $l_r$  – required thread engagement  
 s – recess dimension (nailing plate)  
 t – clamp thickness (includes washers)

## SAFETY RULES AND ADMISSIBLE LOADS

The design of anchor shall be in accordance with the general guidelines in EN 1990.

The value of the design action is  $S_d \leq R_d$ ; where  $S_d$  – value for design action,  $R_d$  – value for design resistance.

The design resistance is calculated using the formula:  $R_d \leq R_k/\gamma_M$ ; where  $R_k$ – characteristic resistance of a single insert or an insert group,  $\gamma_M$ – partial safety factor for material.

The following failure modes must to be taken into consideration in the design of threaded fixing inserts:

- Steel failure of the bolt under tension
- Steel failure of the bolt in shear
- Combined steel failure of the bolt
- Steel failure of the threaded inserts under tension
- Concrete breakout failure under tension (concrete cone failure)
- Concrete edge failure in shear
- Concrete pry-out failure
- Combined concrete failure

## Bolt capacities

The capacities of structural bolts grade 4.6 and 4.8 are presented in the table below.

### Bolt strength and capacities in kN

Thread	Characteristic strength kN ISO 898-1:2009 Table 4 $N_{Rk,s}$		Tension capacity kN EN 1993-1-8:2005 $\varphi_s \times N_{Rk,s}$		Shear capacity kN EN 1993-1-8:2005 $\varphi_s \times V_{Rk,s} = 0.6 \times \varphi_s \times N_{Rk,s}$	
	Grade 4.6	Grade 4.6	Grade 4.6	Grade 4.6	Grade 4.6	Grade 4.6
M8	14.6	29.2	11.7	23.4	7.0	14.0
M10	23.2	46.4	18.6	37.1	11.2	22.3
M12	33.7	67.4	27.0	53.9	16.2	32.3
M16	62.8	125.0	50.2	100.0	30.1	60.0
M20	98.0	203.0	78.4	162.4	48.6	100.7
M24	141.0	293.0	112.8	234.4	67.7	140.6
M30	224.0	466.0	179.2	372.8	107.5	223.7
M36	327.0	678.0	261.6	542.4	157.0	325.4

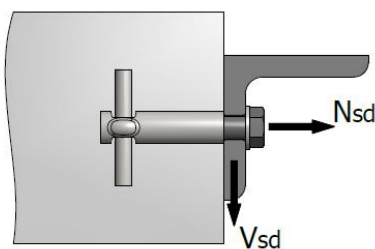
Note:  $\varphi_s = 0.8$  (EN 1993-1-8 table 3.4: bolt under tension or in shear).

### Combined loading for bolts under tension and in shear

If bolts are subject to combined tension and shear, they must be designed according to formula:

$$\left(\frac{N}{\varphi_s \cdot N_{Rk,s}}\right)^2 + \left(\frac{V}{\varphi_s \cdot V_{Rk,s}}\right)^2 \leq 1; \text{ where } N = \text{design tension load, } V = \text{design shear load}$$

If the threaded insert is installed using a recess former (nailing or magnetic plate), shear loads determine bending in the bolt, which must be taken into consideration.



## ADMISSIBLE FORCES

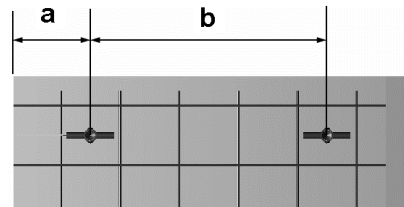
The admissible loads indicated in this catalogue refer to axial pull-out loads or shear loads. When these forces are combined, the result of these forces is obtained through the following formula:

$$\sqrt{N_{sd}^2 + V_{sd}^2}; \text{ where } N_{sd} - \text{pull-out load, } V_{sd} - \text{shear load.}$$

## EDGE DISTANCE AND SPACING

The minimum edge distance depends on numerous factors such as: embedded depth, shear load directed towards the edge of the concrete unit, reinforcements near the inserts.

Note:  
**a** = minimum 50mm



For short edge distance using long inserts, inserts with cross-pin or reinforcement of the next concrete edge are recommended.

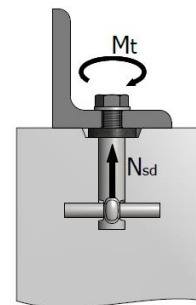
## PROTECTION AGAINST CORROSION

Most of the fixing inserts are electrolytic galvanised. The thickness of the zinc layer is less than 10 µm. The corrosion resistance depends on the environmental circumstances. Hot-dipped galvanising is not possible for fixing inserts made of steel tubes with a flattened end. Some of the fixing inserts are manufactured from stainless steel bar X5CrNi18.10 (SS2) or X2CrNiMo17.13.3 (SS4) - SR EN 10088.3. The cast-in threaded elements (anchors or fixing inserts) can be cast flush or recessed for protection against corrosion. This recess is filled with fine concrete after use.

## CONCRETE QUALITY

The loads indicated in tables are available for concrete with strength of 25 MPa. For other concrete strength values, applying the correction coefficients to the loads indicated is necessary, as shown below.

Concrete strength MPa	Correction coefficient
15	0.8
25	1.0
35	1.2
45	1.3
55	1.4



## SPECIFIC CASES

If the fixing inserts are in recessed, we recommend using adequate filler (spacer) to load the insert properly without loading the concrete. If that is not possible, increase the real load applied to the insert by the value N shown below, then compare that with the admissible load from the catalogue.

$$N = M_a / 0.2 \times d_{nom}$$

N = additional force - daN

$M_a$  = torque applied to the screw - daNm

$d_{nom}$  = diameter of the inserts - m

Example:

For a fixing insert M12:  $d_{nom} = 0.012$  m

Maximum torque 0.8 daNm

$$N = 0.8 / 0.2 \times 0.012 = 333 \text{ daN}$$

This means that, for fixing inserts BSR M12, after applying a torque, more than half of the load capacity is lost and major torque is prohibited.

Use of a torque wrench is recommended to prevent unexpected high loads on the fixing inserts. Torque values and forces can be found in the table below.

No.	Fixing insert diameter	Torque [Nm]	Force [kN]
	[mm]		
1	M6	1	0.83
2	M8	2	1.25
3	M10	4	2.0
4	M12	8	3.3
5	M16	17	5.3
6	M20	35	8.7
7	M24	53	11.0
8	M30	96	16.0

## REINFORCEMENTS

The cross-pin of the fixing inserts BSRS, BSRFS, HBUS do not increase the admissible load, but must be regarded as an extra safety measure if there are voids or air pockets.

The fixing inserts with cross-drilled holes permit an increase of admissible load by 10% when a “U” shape anchor of sufficient length (approximately 50 x diameter) is added in the cross-hole.

## TERWA FIXING INSERTS

1. FIXING INSERTS WITHOUT CROSS-PIN: BSR, BSRF, HBU, BSH
2. FIXING INSERTS WITH CROSS-PIN: BSRS, BSRFS, HBUS
3. FIXING BOLTS ANCHORS: BBB / BBB-SS, BBP / BBP-SS
4. FIXING AND LIFTING ANCHOR TRL, TGK, TGL.

### Group 1 and 2

The admissible pull-out load can be used with a minimum:

- edge distance of:  $a=1.5 \times$  total length of the anchor
- centre to centre distance of:  $b = 3 \times$  total length of the anchor

The admissible shear load can be used with a minimum:

- edge distance of:  $a=2.5 \times$  total length of the anchor
- centre to centre distance of:  $5 \times$  total length of the anchor

Reduction factors for small edge distances

Edge distance	Admissible pull-out force N <sub>adm</sub>	Edge distance	Admissible shear load force V <sub>adm</sub>	Y = 1.2	Y = 1.4
2.5 x L	100%	2.5 x L	100%	100%	100%
2.0 x L	100%	2.0 x L	85%	100%	100%
1.5 x L	100%	1.5 x L	65%	78%	91%
1.0 x L	75%	1.0 x L	40%	48%	56%
0.5 x L	50%	0.5 x L	15%	18%	21%

The reduced admissible shear loads in the direction towards the edge can be increased by using additional reinforcement.

-for straight reinforcement Y = 1.2

-for “U” bent reinforcement Y = 1.4

The loads mentioned for inserts are valid for concrete quality B25 (25 MPa); for a higher quality of concrete, use the factors as indicated in the table.

Concrete quality	B25	B35	B45	B55	B65
Factor	1.00	1.18	1.34	1.48	1.61

The load must meet the following requirements:

- $N_{sd} \leq N_{Rd}$ ; where  $N_{sd}$  apparent pull-out load,  $N_{Rd}$  admissible pull-out load
- $V_{sd} \leq V_{Rd}$ ; where  $V_{sd}$  apparent shear load,  $V_{Rd}$  admissible shear load

### Group 3

The international standards (CEB Bulletin 233 and Technical Approval of Metal Anchor for Use in Concrete 1997) are valid for the concrete qualities B25–B65. Terwa Bolt anchors BBB, BBB-SS, BBP and BBP-SS meet the requirement mentioned in the standards and can be calculated without any additional tests.



#### Group 4

The fixing and lifting anchors TGK, TGL are especially suited for use in thin prefab panels and where anchors must bear high pull-out loads. These items are a subject for another technical manual.

#### Ultimate limit state

The design of anchor shall be in accordance with the general guidelines in EN 1990. It must be shown that the design value of the action  $S_d$  is equal to or smaller than the design value of the resistance  $R_d$ .

$$S_d \leq R_d$$

Spacing, edge distance as well as thickness of concrete element should not remain below the given minimum values.

The spacing between the outer insert of adjoining groups or the distance to single inserts should be  $a > S_{cr,N}$

Actions to be used in design may be obtained from national regulations or, in their absence, from the relevant sections in EN 1991. The partial safety factors for actions may be taken from national regulations or, in their absence, from CEN/TS 1992-4-2.

The design resistance is calculated as:  $R_d \leq R_k/\gamma_M$ .

#### Design method

#### Resistance to tension loads

#### Required verifications

- Steel failure:  $N_{Sd} \leq N_{Rk,s}/\gamma_{Ms}$
- Combined pull-out and concrete cone failure:  $N_{Sd} \leq N_{Rk,p}/\gamma_{Mp}$
- Concrete cone failure:  $N_{Sd} \leq N_{Rk,c}/\gamma_{Mc}$
- Splitting failure:  $N_{Sd} \leq N_{Rk,sp}/\gamma_{Msp}$

The partial safety factors  $\gamma_{Ms}$  for steel failure are determined as a function of the type of loading:

#### - Tension loading

$$\gamma_{Ms} = \frac{1.2}{f_{yk}/f_{uk}} \geq 1.4$$

#### - Shear loading

$$\gamma_{Ms} = \frac{1.0}{f_{yk}/f_{uk}} \geq 1.25 \quad f_{uk} \leq 800 \text{ MPa}, f_{yk}/f_{uk} \geq 0.8$$

$$\gamma_{Ms} = 1.5 \quad f_{uk} > 800 \text{ MPa}, f_{yk}/f_{uk} > 0.8$$

The partial safety factors for concrete failure, pry-out failure and edge failure ( $\gamma_{Mc}$ ), splitting failure ( $\gamma_{Msp}$ ), and pull-out failure ( $\gamma_{Mp}$ ) are given in CEN/TS 1992-4-2.

$\gamma_{Mc} = \gamma_c \times \gamma_2$ ;  $\gamma_c$  – partial safety factor for concrete = 1.5,  $\gamma_2$  – partial safety factor taking into account the installation safety of an anchor system.

The partial safety factor  $\gamma_2$  is evaluated based on the installation safety test results:

#### - Tension loading

= 1.0 for systems with high installation safety

$\gamma_2 = 1.0$  for systems with high installation safety

$\gamma_2 = 1.2$  for systems with normal installation safety

$\gamma_2 = 1.4$  for systems with low but still acceptable installation safety

#### - Shear loading

$\gamma_2 = 1.0$

For partial safety factors  $\gamma_{Msp}$  and  $\gamma_{Mp}$ , the value  $\gamma_{Mc}$  must be taken into account.

### Steel failure

The characteristic resistances of an insert in case of steel failure  $N_{Rk,s}$  are

$$N_{Rk,s} = A_s \times f_{uk} [N]$$

Where:  $N_{Rk,s}$  – is specified in CEN/TS 1992-4-2  
 $A_s$  – stress on cross-section of steel  
 $f_{uk}$  – characteristic ultimate tensile strength for steel (nominal value)

### Combined pull-out and concrete cone failure

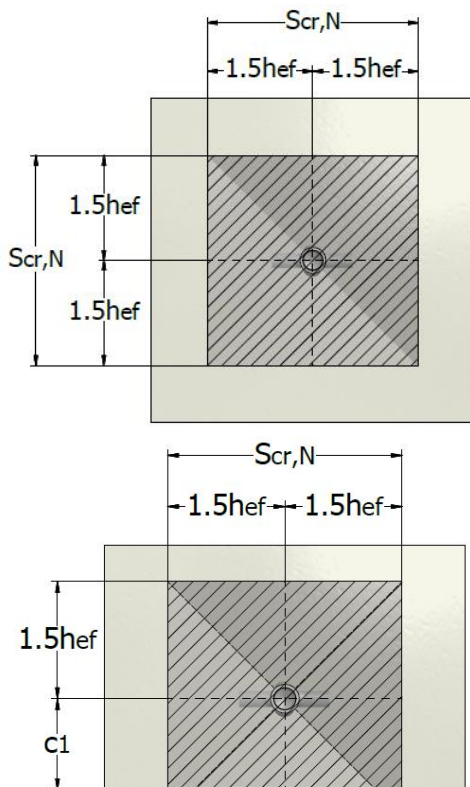
The characteristic resistance for combined pull-out and concrete cone failure is

$$N_{Rk,p} = N_{Rk,p}^0 \times (A_{p,N}/A_{p,N}^0) \times \psi_{s,Np} \times \psi_{G,Np} \times \psi_{ec,Np} \times \psi_{re,Np} [N]$$

The different factors in the above-mentioned equation for inserts according to current experience are given in CEN/TS 1992-4-2.

$$N_{Rk,p}^0 = \pi \times d \times h_{ef} \times \tau_{Rk} [N] \text{ where } \tau_{Rk} \text{ in } N/mm^2, d \text{ and } h_{ef} \text{ in mm.}$$

The geometric effect of spacing and edge distance on the characteristic resistance is taken into account by the value  $A_{p,N}/A_{p,N}^0$



$$A_{p,N}^0 = S_{cr,Np} \times S_{cr,Np}$$

$$A_{p,N} = (C_1 + 0.5S_{cr,Np}) \times S_{cr,Np} \\ \text{If } c_1 \leq c_{cr,Np}$$

$$S_{cr,Np} = 20 \times \left( \frac{\tau_{Rk,ucr}}{7.5} \right)^{0.5} \leq 3 \times h_{ef} [mm]$$

$$c_{cr,Np} = S_{cr,Np}/2 [mm]$$

### Concrete break (cone) failure

The characteristic resistance of an insert or a group of inserts, respectively, for concrete cone failure is:

$$N_{Rk,c} = N_{Rk,c}^0 \times (A_{c,N}/A_{c,N}^0) \times \psi_{s,N}$$

$N_{Rk,c}$  – characteristic concrete cone failure resistance for an insert.

$N_{Rk,c}^0$  - characteristic concrete cone failure resistance for an insert located far from the edges of the concrete element or adjacent inserts

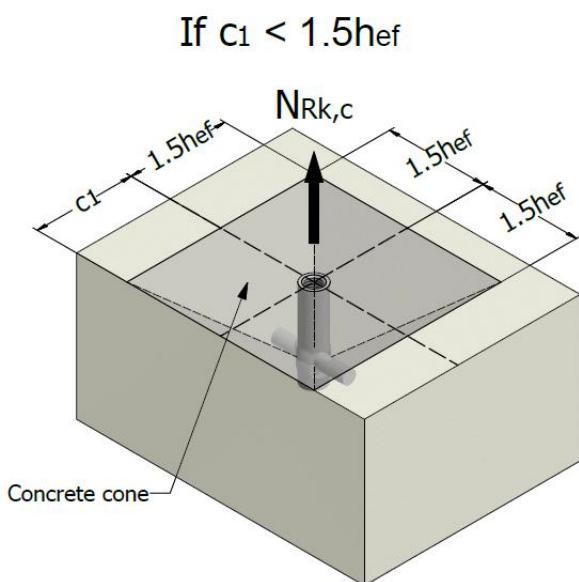
$A_{c,N}$  – Actual projected area of the idealised concrete cone developed by the insert on the concrete surface

$A_{c,N}^0$  – Area of the idealised concrete breakout cone on the surface, of an individual insert located far from the edges of the concrete element or adjacent inserts.

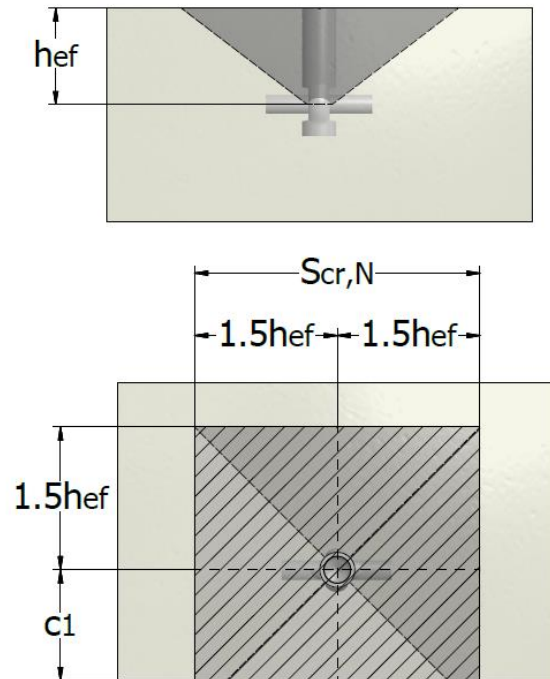
$\psi_{s,N}$  – stress disturbance factor dependent on the proximity of edges.

$$\psi_{s,N} = 0.7 + 0.3 \times \left( \frac{c_i}{1.5h_{ef}} \right) \leq 1$$

$c_i$  – smallest edge distance



$$A_{c,N} = 3h_{ef}(1.5h_{ef} + c_1)$$



The characteristic resistance to concrete cone failure for a single insert, placed a minimum distance  $1.5h_{ef}$  from any edge is

$$N_{Rk,c}^0 = k_{cr} \times \sqrt{f_{ck,cube}} \times h_{ef}^{1.5}$$

$k_{cr}$  - 13 for inserts in uncracked concrete, 10 for insert in cracked concrete.

$f_{ck,cube}$  - characteristic compressive strength of the concrete [MPa]

$h_{ef}$  – effective embedded depth of the insert [mm]

### Effect of insert spacing and edge distance

$A_{c,N}$  – Actual projected area limited by overlapping concrete cones of adjacent inserts

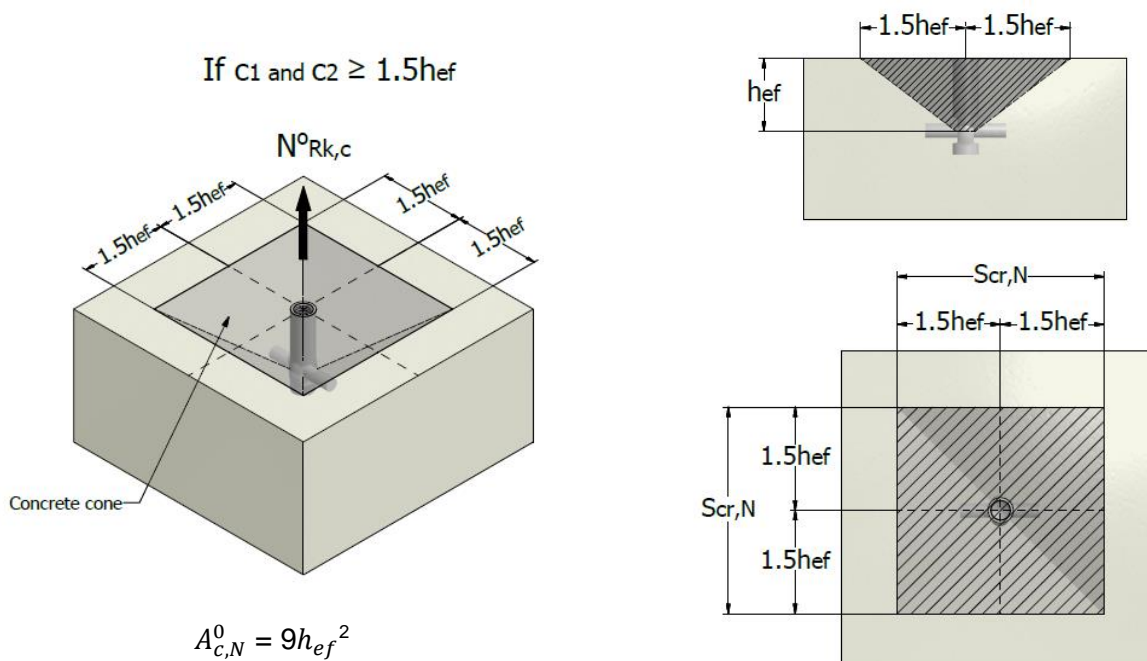
$A_{c,N}^0$  – reference projected area of a single insert

$$A_{c,N}^0 = s_{cr,N} \times s_{cr,N}$$

$$s_{cr,N} = 2c_{cr,N}$$

$$c_{cr,N} = 1.5h_{ef}$$

$$A_{c,N}^0 = 9h_{ef}^2$$



### Resistance to shear loads

#### Required verification

- Steel failure, shear load without lever arm:  $V_{Sd} \leq V_{Rk,s}/\gamma_{Ms}$
- Steel failure, shear load with lever arm:  $V_{Sd} \leq V_{Rk,s}/\gamma_{Ms}$
- Concrete pry-out failure:  $V_{Sd} \leq V_{Rk,cp}/\gamma_{Mc}$

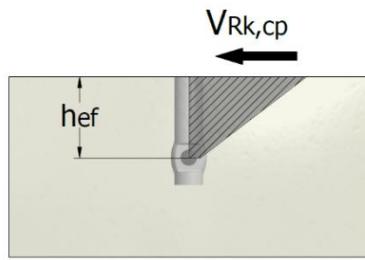
#### Steel failure

The characteristic resistances of an insert for steel failure  $V_{Rk,s}$  (shear load without lever arm) is

$$V_{Rk,s} = 0.5 A_s \times f_{uk}[\text{N}]$$

Where:  $V_{Rk,s}$  – is specified in CEN/TS 1992-4-2  
 $A_s$  – stress cross-section of steel  
 $f_{uk}$  – characteristic ultimate tensile strength for steel (nominal value)

### Concrete pry-out failure



$$V_{Rk,cp} = k \times N_{Rk,c}$$

$$k = 1 \text{ for } h_{ef} < 60 \text{ mm}$$

$$k = 2 \text{ for } h_{ef} \geq 60 \text{ mm}$$

### Concrete edge failure

The characteristic resistance for an insert for concrete edge failure corresponds to:

$$V_{Rk,c} = V_{Rk,c}^0 \times (A_{c,V}/A_{c,V}^0) \times \psi_{s,V} \times \psi_{h,V} \times \psi_{re,V}$$

$V_{Rk,c}$  – Characteristic resistance of a single insert in shear

$V_{Rk,c}^0$  – Characteristic resistance of an insert loaded perpendicular to the edge in cracked concrete

$A_{c,V}$  – Projected area of the idealised concrete breakout area of an insert directed towards an edge

$A_{c,V}^0$  – area of the idealised concrete breakout cone on the lateral concrete surface, of an insert located far from edges parallel to the loading direction, or adjacent inserts, with a thickness greater than the embedded depth of the insert, with the shape of the fracture area idealised as a half pyramid with an equal height  $c_1$  and a base length of  $1.5c_1$  and  $3c_1$ .

$\psi_{s,V}$  – factor which accounts for the disturbance of the stress distribution

$\psi_{h,V}$  – thickness of the structural component disturbance factor

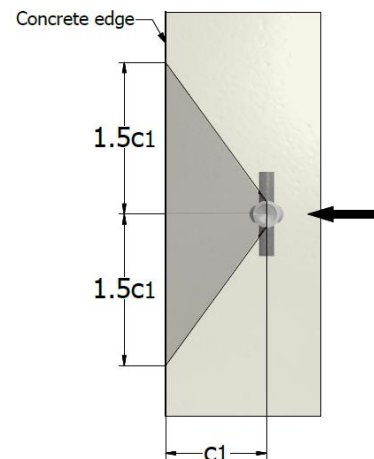
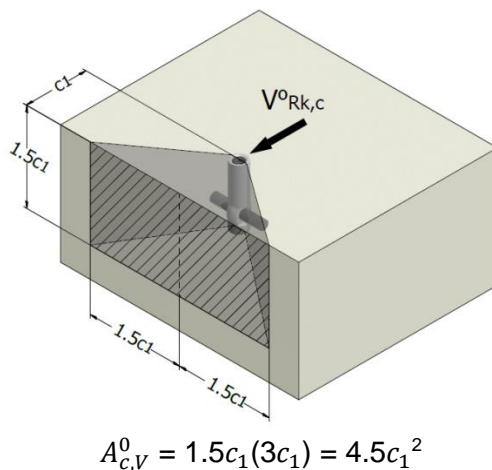
$\psi_{re,V}$  – position of the fastening disturbance factor

$\psi_{s,V}$ ,  $\psi_{h,V}$  and  $\psi_{re,V}$  according CEN/TS 1992-4-2.

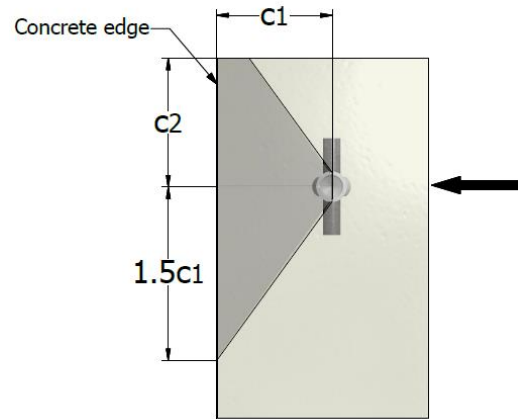
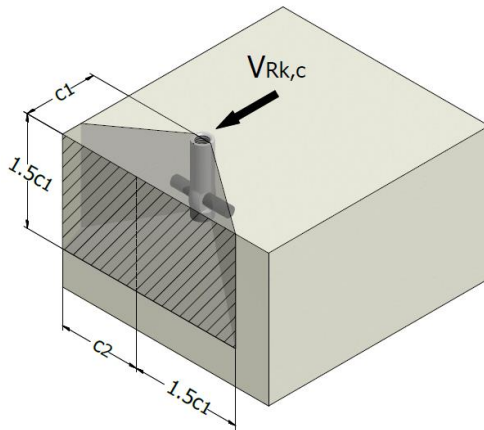
$$V_{Rk,c}^0 = k_1 \times d^\alpha \times h_{ef}^\beta \times \sqrt{f_{ck,cube}} \times c_1^{1.5} \text{ [N]}$$

- $k_1 = 1.7$  for applications in cracked concrete
- $k_1 = 2.4$  for applications in uncracked concrete
- $\alpha = 0.1 \times (h_{ef}/c_1)^{0.5}$   $d$  outer diameter of inserts  $\leq 60\text{mm}$ ,  $h_{ef} \leq 8 \times d$
- $\beta = 0.1 \times (d/c_1)^{0.2}$

Idealised concrete cone and area  $A_{c,V}^0$  of concrete cone for a single insert



Actual area of concrete cone of anchorage on the lateral concrete surface.  $A_{c,V}$  of concrete cone for an insert anchor



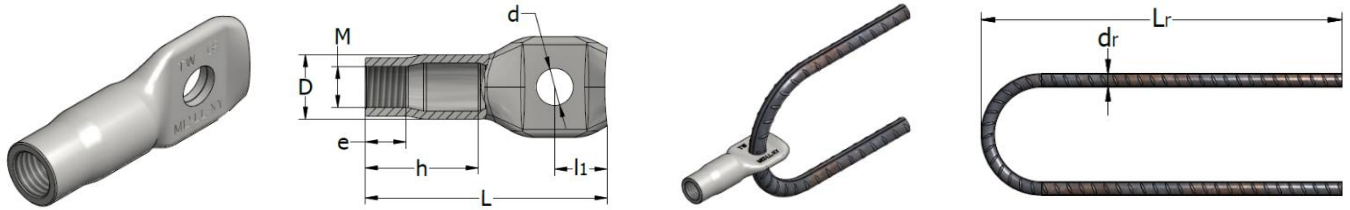
$$A_{c,V} = 1.5c_1(1.5c_1 + c_2), c_2 \leq 1.5c_1$$

The admissible static tensile loads are determined after combining the data from numerous tests for pure pull or shear load. The data obtained from these tests take into account multiple factors such as: composition, uniformity, strength, age of concrete and the circumstances that arise at installation. The admissible static loads for Terwa fixing inserts, embedded completely in concrete, are valid for pull-out or shear load and have a safety factor of 3 to 4 x the average breaking load of concrete with strength of 25 MPa.

## FIXING INSERTS

Terwa fixing inserts are designed for low capacities and are primarily used for temporary fixing, not structural applications.

### FIXING INSERT WITH FLAT END AND CROSS-DRILLED HOLE – BSR



Fixing inserts BSR are manufactured from welded steel precision tube S235JR NBK electrolytic galvanized (EV) or from stainless steel tube 1.4301 (SS2) or 1.4404 (SS4). **Do not use these inserts for lifting.**

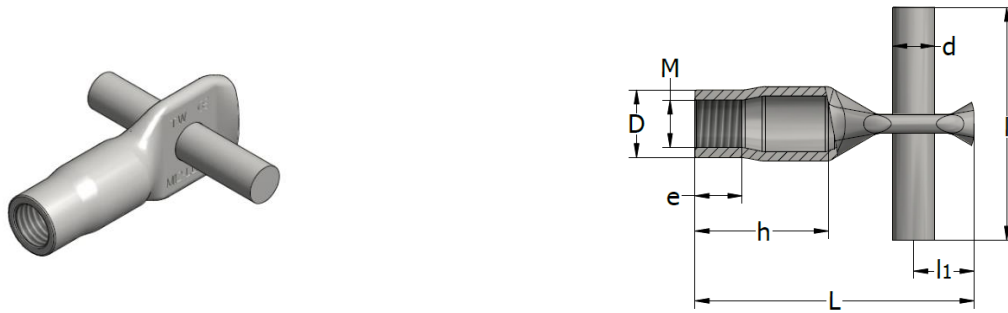
BSR-EV	Product no.	Thread	Overall length L	D	d	l1	e	h	Tail	Admissible load				
										d <sub>r</sub> xUxL <sub>r</sub>	Axial*	angle		
												30 °	45 °	90 °
M	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mmxUxmm]	[kN]	[kN]	[kN]	[kN]		
BSR M6x40-EV	61217	6	40	7	5.4	5			4xUx120	1.5	0.92	0.62	0.37	
BSR M8x50-EV	46095	8	50	11	7.2	7	8	26	5xUx140	2.5	1.5	1.0	0.6	
BSR M10x50-EV	46098	10	50	13	9.2	11	10	24	6xUx175	3.5	2.0	1.4	0.8	
BSR M10x60-EV	47772	10	60	13	9.2	11	10	24	6xUx175	3.5	2.0	1.4	0.8	
BSR M12x60-EV	45468	12	60	16	9.2	13	11	28	8xUx300	5.0	3.0	2.2	1.4	
BSR M16x80-EV	46104	16	80	22	12.2	20	14	32	10xUx350	8.5	7.0	6.0	4.3	
BSR M16x100-EV	46107	16	100	22	12.2	20	14	44	10xUx350	10.0	8.0	7.0	5.0	
BSR M16x120-EV	46110	16	120	22	12.2	20	14	53	10xUx350	12.0	8.5	7.5	5.0	
BSR M20x100-EV	46113	20	100	27	14.2	23	18	41	12xUx400	12.5	9.6	9.12	6.25	
BSR M20x120-EV	46114	20	120	27	14.2	23	18	50	12xUx400	14.0	11.0	10.0	7.0	
BSR M24x120-EV	46119	24	120	32	14.2	28	21	55	12xUx400	16.0	12.5	11.0	8.0	

BSR-SS2 (W 1.4301)	Product no.	Thread	Overall length L	D	d	l1	e	h	Tail	Admissible load				
										d <sub>r</sub> xUxL <sub>r</sub>	Axial*	angle		
												30 °	45 °	90 °
M	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mmxUxmm]	[kN]	[kN]	[kN]	[kN]	
BSR M8x50-SS2	46093	8	50	11	7.2	7	8	26	5xUx140	2.5	1.5	1.0	0.6	
BSR M10x50-SS2	46096	10	50	13	9.2	11	10	24	6xUx175	3.5	2.0	1.4	0.8	
BSR M10x60-SS2	47786	10	60	13	9.2	11	10	24	6xUx175	3.5	2.0	1.4	0.8	
BSR M12x60-SS2	46099	12	60	16	9.2	13	11	28	8xUx300	5.0	3.0	2.2	1.4	
BSR M16x80-SS2	46102	16	80	22	12.2	20	14	32	10xUx350	8.5	7.0	6.0	4.3	
BSR M16x100-SS2	46105	16	100	22	12.2	20	14	44	10xUx350	10.0	8.0	7.0	5.0	
BSR M16x120-SS2	46108	16	120	22	12.2	20	14	53	10xUx350	12.0	8.5	7.5	5.0	
BSR M20x100-SS2	46111	20	100	27	14.2	23	18	41	12xUx400	12.5	9.6	9.12	6.25	
BSR M20x120-SS2	46115	20	120	27	14.2	23	18	50	12xUx400	14.0	11.0	10.0	7.0	
BSR M24x120-SS2	46117	24	120	32	14.2	28	21	55	12xUx400	16.0	12.5	11.0	8.0	

BSR-SS4 (W 1.4404)	Product no.	Thread	Overall length L	D	d	l1	e	h	Tail	Admissible load				
										d <sub>r</sub> xUxL <sub>r</sub>	Axial*	angle		
												30 °	45 °	90 °
M	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mmxUxmm]	[kN]	[kN]	[kN]	[kN]	
BSR M8x50-SS4	46094	8	50	11	7.2	7	8	26	5xUx140	2.5	1.5	1.0	0.6	
BSR M10x50-SS4	46097	10	50	13	9.2	11	10	24	6xUx175	3.5	2.0	1.4	0.8	
BSR M10x60-SS4	47787	10	60	13	9.2	11	10	24	6xUx175	3.5	2.0	1.4	0.8	
BSR M12x60-SS4	46100	12	60	16	9.2	13	11	28	8xUx300	5.0	3.0	2.2	1.4	
BSR M16x80-SS4	46103	16	80	22	12.2	20	14	32	10xUx350	8.5	7.0	6.0	4.3	
BSR M16x100-SS4	46106	16	100	22	12.2	20	14	44	10xUx350	10.0	8.0	7.0	5.0	
BSR M16x120-SS4	46109	16	120	22	12.2	20	14	53	10xUx350	12.0	8.5	7.5	5.0	
BSR M20x100-SS4	46112	20	100	27	14.2	23	18	41	12xUx400	12.5	9.6	9.12	6.25	
BSR M20x120-SS4	46116	20	120	27	14.2	23	18	50	12xUx400	14.0	11.0	10.0	7.0	
BSR M24x120-SS4	46118	24	120	32	14.2	28	21	55	12xUx400	16.0	12.5	11.0	8.0	

Note: \* the working load is valid only if the reinforcing tail is used. Terwa does not supply the tail.



**FIXING INSERTS WITH FLAT END AND CROSS-PIN – BSRS**


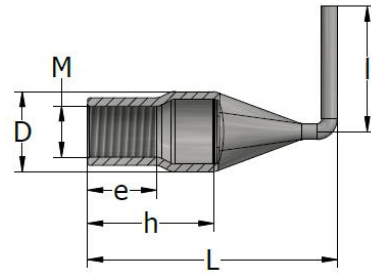
Fixing inserts BSRS are manufactured from welded steel precision tube S235JR NBK electrolytic galvanized (EV) or from stainless steel tube 1.4301 (SS2) or 1.4404 (SS4). The cross-pin is made from steel bar S235JR. **Do not use these inserts for lifting.**

BSRS-EV	Product no.	Thread	Overall length	D	l1	e	h	Cross-pin		Admissible load			
								d	l	Axial	Angle		
											30 °	45 °	90 °
M	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kN]	[kN]	[kN]	[kN]	
BSRS M8x50-EV	46120	8	50	11	7	8	26	7	50	2.5	1.5	1.0	0.6
BSRS M10x50-EV	46101	10	50	13	11	10	24	9	50	3.5	2.0	1.4	0.8
BSRS M12x60-EV	46125	12	60	16	13	11	28	9	50	5.0	3.0	2.2	1.4
BSRS M16x80-EV	46128	16	80	22	20	14	32	12	80	8.5	7.0	6.0	4.3
BSRS M16x100-EV	46129	16	100	22	20	14	44	12	80	10.0	8.0	7.0	5.0
BSRS M16x120-EV	46130	16	120	22	20	14	53	12	80	12.0	8.5	7.5	5.0
BSRS M20x100-EV	46137	20	100	27	23	18	41	14	100	12.5	9.6	9.12	6.25
BSRS M20x120-EV	46138	20	120	27	23	18	50	14	100	14.0	11.0	10.0	7.0
BSRS M24x120-EV	46143	24	120	32	28	21	55	14	100	18.0	14.0	12.5	9.0

BSRS-SS2 (W 1.4301)	Product no.	Thread	Overall length	D	l1	e	h	Cross-pin		Admissible load			
								d	l	Axial	Angle		
											30 °	45 °	90 °
M	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kN]	[kN]	[kN]	[kN]	
BSRS M8x50-SS2	46121	8	50	11	7	8	26	7	50	2.5	1.5	1.0	0.6
BSRS M10x50-SS2	46123	10	50	13	11	10	24	9	50	3.5	2.0	1.4	0.8
BSRS M12x60-SS2	46126	12	60	16	13	11	28	9	50	5.0	3.0	2.2	1.4
BSRS M16x80-SS2	46131	16	80	22	20	14	32	12	80	8.5	7.0	6.0	4.3
BSRS M16x100-SS2	46132	16	100	22	20	14	44	12	80	10.0	8.0	7.0	5.0
BSRS M16x120-SS2	46133	16	120	22	20	14	53	12	80	12.0	8.5	7.5	5.0
BSRS M20x100-SS2	46139	20	100	27	23	18	41	14	100	12.5	9.6	9.12	6.25
BSRS M20x120-SS2	46140	20	120	27	23	18	50	14	100	14.0	11.0	10.0	7.0
BSRS M24x120-SS2	46144	24	120	32	28	21	55	14	100	18.0	14.0	12.5	9.0

BSRS-SS4 (W 1.4404)	Product no.	Thread	Overall length	D	l1	e	h	Cross-pin		Admissible load			
								d	l	Axial	Angle		
											30 °	45 °	90 °
M	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kN]	[kN]	[kN]	[kN]	
BSRS M8x50-SS4	46122	8	50	11	7	8	26	7	50	2.5	1.5	1.0	0.6
BSRS M10x50-SS4	46124	10	50	13	11	10	24	9	50	3.5	2.0	1.4	0.8
BSRS M12x60-SS4	46127	12	60	16	13	11	28	9	50	5.0	3.0	2.2	1.4
BSRS M16x80-SS4	46134	16	80	22	20	14	32	12	80	8.5	7.0	6.0	4.3
BSRS M16x100-SS4	46135	16	100	22	20	14	44	12	80	10.0	8.0	7.0	5.0
BSRS M16x120-SS4	46136	16	120	22	20	14	53	12	80	12.0	8.5	7.5	5.0
BSRS M20x100-SS4	46141	20	100	27	23	18	41	14	100	12.5	9.6	9.12	6.25
BSRS M20x120-SS4	46142	20	120	27	23	18	50	14	100	14.0	11.0	10.0	7.0
BSRS M24x120-SS4	46145	24	120	32	28	21	55	14	100	18.0	14.0	12.5	9.0



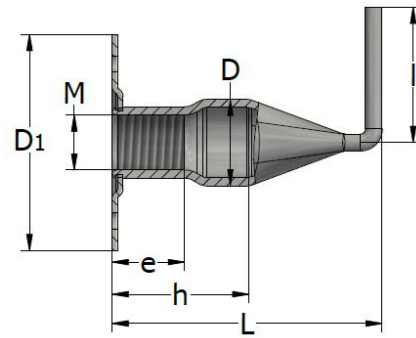
**FIXING INSERTS WITH BENT END – BSH**


Fixing inserts BSH are manufactured from steel precision tube S235JR NBK electrolytic galvanised (EV) or from stainless steel tube 1.4301 (SS2) or 1.4404 (SS4). **Do not use these inserts for lifting.**

BSH-BL	Product no.	BSH-EV	Product no.	Thread	Overall length L	D	l	e	h	Admissible load
				M	[mm]	[mm]	[mm]	[mm]	[mm]	
BSH M8x30	45135	BSH M8x30-EV	45141	8	30	11	20	8	16	1.5
BSH M8x50	45435	BSH M8x50-EV	45316	8	50	11	20	8	20	3.0
BSH M10x35	45136	BSH M10x35-EV	45142	10	35	13	25	10	16	2.0
BSH M10x45		BSH M10x45-EV	60280	10	40	13	25	13	16	3.0
BSH M10x60	45417	BSH M10x60-EV	45317	10	60	13	25	13	30	6.0
BSH M12x45	45137	BSH M12x45-EV	45143	12	45	16	25	14	20	4.0
BSH M12x50		BSH M12x50-EV	60283	12	50	16	25	14	25	4.0
BSH M12x70	45423	BSH M12x70-EV	45424	12	70	16	30	24	35	8.0
BSH M16x50		BSH M16x50-EV	60275	16	50	22	30	19	24	7.0
BSH M16x60	45138	BSH M16x60-EV	45144	16	60	22	30	19	24	8.0
BSH M16x90		BSH M16x90-EV	60341	16	90	22	35	19	40	11.0
BSH M16x100	45429	BSH M16x100-EV	45430	16	100	22	35	19	40	13.0
BSH M20x70	45139	BSH M20x70-EV	45145	20	70	27	30	18	30	12.0
BSH M20x80		BSH M20x80-EV	60288	20	80	27	30	24	35	12.0
BSH M20x100	45432	BSH M20x100-EV	45433	20	100	27	35	24	40	16.0
BSH M24x80	45140	BSH M24x80-EV	45146	24	80	32	40	21	33	16.0
BSH M24x100		BSH M24x100-EV	60291	24	100	32	30	28	40	16.0

BSH-SS2 (W 1.4301)	Product no.	BSH-SS4 (W 1.4404)	Product no.	Thread	Overall length L	D	l	e	h	Admissible load
				M	[mm]	[mm]	[mm]	[mm]	[mm]	
BSH M8x30-SS2	45645	BSH M8x30-SS4	45147	8	30	11	20	8	16	1.5
BSH M8x50-SS2	45598	BSH M8x50-SS4	45312	8	50	11	20	8	20	3.0
BSH M10x35-SS2	45418	BSH M10x35-SS4	45148	10	35	13	25	10	16	2.0
BSH M10x45-SS2	60282	BSH M10x45-SS4	60281	10	45	13	25	13	16	3.0
BSH M10x60-SS2	45599	BSH M10x60-SS4	45313	10	60	13	25	13	30	6.0
BSH M12x45-SS2	45600	BSH M12x45-SS4	45149	12	45	16	25	14	20	4.0
BSH M12x50-SS2	60285	BSH M12x50-SS4	60284	12	50	16	25	14	25	4.0
BSH M12x70-SS2	45601	BSH M12x70-SS4	45425	12	70	16	30	24	35	8.0
BSH M16x50-SS2	60287	BSH M16x50-SS4	60286	16	50	22	30	19	24	7.0
BSH M16x60-SS2	45602	BSH M16x60-SS4	45150	16	60	22	30	19	24	8.0
BSH M16x90-SS2	60343	BSH M16x90-SS4	60342	16	90	22	35	19	40	10.0
BSH M16x100-SS2	45603	BSH M16x100-SS4	45431	16	100	22	35	19	40	13.0
BSH M20x70-SS2	45604	BSH M20x70-SS4	45151	20	70	27	30	18	30	12.0
BSH M20x80-SS2	60290	BSH M20x80-SS4	60289	20	80	27	30	24	35	12.0
BSH M20x100-SS2	45605	BSH M20x100-SS4	45434	20	100	27	35	24	40	16.0
BSH M24x80-SS2	45606	BSH M24x80-SS4	45152	24	80	32	40	21	33	16.0
BSH M24x100-SS2	60293	BSH M24x100-SS4	60292	24	100	32	30	28	40	16.0

BSH-TV	Product no.	Thread	Overall length L	D	l	e	h	Admissible load
		M	[mm]	[mm]	[mm]	[mm]	[mm]	
BSH M12x150-TV	45633	12	150	16	25	11	120	8.0
BSH M16x220-TV	45634	16	220	22	30	14	155	13.0
BSH M20x90-TV	45635	20	90	27	30	18	40	12.0
BSH M20x270-TV	45636	20	270	27	30	18	210	16.0
BSH M24x320-TV	45637	24	320	32	40	21	270	16.0

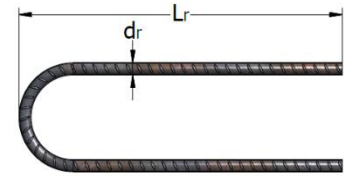
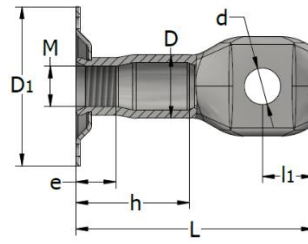
**FIXING INSERTS WITH NAILING PLATE AND BENT END – BSHF**


Fixing inserts BSHF are manufactured from steel precision tube S235JR NBK electrolytic galvanised (EV) or from stainless steel tube 1.4301 (SS2) or 1.4404 (SS4). **Do not use these inserts for lifting.**

BSHF-EV	Product no.	Thread	Overall length	D	D <sub>1</sub>	l	e	h	Admissible load
		M	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kN]
BSHF M8x50-EV	46905	8	50	11	34	20	8	20	3.0
BSHF M10x45-EV	60296	10	45	13	34	25	13	16	3.0
BSHF M10x60-EV	46906	10	60	13	34	25	13	30	6.0
BSHF M12x45-EV	60297	12	45	16	40	25	14	20	4.0
BSHF M12x50-EV	60298	12	50	16	40	25	14	25	4.0
BSHF M12x70-EV	46907	12	70	16	40	30	24	35	8.0
BSHF M16x50-EV	60355	16	50	22	48	30	19	24	7.0
BSHF M16x60-EV	60276	16	60	22	48	30	19	24	8.0
BSHF M16x90-EV	60346	16	90	22	48	35	19	40	11.0
BSHF M16x100-EV	46908	16	100	22	48	35	19	40	13.0
BSHF M20x80-EV	60299	20	80	27	48	30	24	35	12.0
BSHF M20x100-EV	46909	20	100	27	48	35	24	40	16.0
BSHF M24x100-EV	60234	24	100	32	57	30	28	40	16.0

BSHF-SS2	Product no.	Thread	Overall length	D	D <sub>1</sub>	l	e	h	Admissible load
		M	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kN]
BSHF M12x70-SS2	60352	12	70	16	40	30	24	35	8.0
BSHF M16x50-SS2	60357	16	50	22	48	30	19	24	7.0
BSHF M16x60-SS2	60345	16	60	22	48	30	19	24	8.0
BSHF M16x90-SS2	60348	16	90	22	48	35	19	40	11.0
BSHF M16x100-SS2	60350	16	100	22	48	35	19	40	13.0

BSHF-SS4	Product no.	Thread	Overall length	D	D <sub>1</sub>	l	e	h	Admissible load
		M	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kN]
BSHF M12x70-SS4	60351	12	70	16	40	30	24	35	8.0
BSHF M16x50-SS4	60356	16	50	22	48	30	19	24	7.0
BSHF M16x60-SS4	60344	16	60	22	48	30	19	24	8.0
BSHF M16x90-SS4	60347	16	90	22	48	35	19	40	11.0
BSHF M16x100-SS4	60349	16	100	22	48	35	19	40	13.0

**FIXING INSERTS WITH NAILING PLATE, FLAT END AND CROSS-DRILLED HOLE – BSRF**


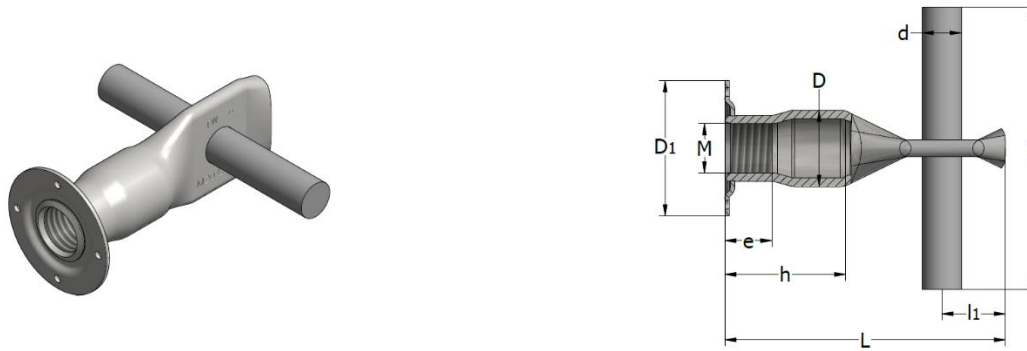
Fixing inserts BSRF are manufactured from steel precision tube S235JR NBK galvanised (EV) or from stainless steel tube 1.4301 (SS2) or 1.4404 (SS4). **Do not use these inserts for lifting.**

BSRF-EV	Product no.	Thread	Overall length	D	D <sub>1</sub>	d	l <sub>1</sub>	e	h	Tail d <sub>r</sub> xU <sub>x</sub> L <sub>r</sub>	Admissible load			
											Axial*	angle		
												30 °	45 °	90 °
		M	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mmxUxmm]	[kN]	[kN]	[kN]	[kN]
BSRF M8x50-EV	45206	8	50	11	34	7.2	7	8	26	5xUx140	2.5	1.5	1.0	0.6
BSRF M10x50-EV	45441	10	50	13	34	9.2	11	10	24	6xUx175	3.5	2.0	1.4	0.8
BSRF M10x60-EV	61011	10	60	13	34	9.2	11	10	24	6xUx175	3.5	2.0	1.4	0.8
BSRF M12x60-EV	45442	12	60	16	40	9.2	13	11	28	8xUx300	5.0	3.0	2.2	1.4
BSRF M12x70-EV	61238	12	70	16	40	9.2	13	11	28	8xUx300	5.0	3.0	2.2	1.4
BSRF M16x80-EV	45443	16	80	22	48	12.2	20	14	32	10xUx350	8.5	7.0	6.0	4.3
BSRF M16x100-EV	45458	16	100	22	48	12.2	20	14	44	10xUx350	10.0	8.0	7.0	5.0
BSRF M16x120-EV	45646	16	120	22	48	12.2	20	14	53	10xUx350	12.0	8.5	7.5	5.0
BSRF M20x100-EV	45444	20	100	27	48	14.2	23	18	41	12xUx400	12.5	9.6	9.12	6.25
BSRF M20x120-EV	45658	20	120	27	48	14.2	23	18	50	12xUx400	14.0	11.0	10.0	7.0
BSRF M24x120-EV	45476	24	120	32	57	14.2	28	21	55	12xUx400	16.0	12.5	11.0	8.0

BSRF-SS2 (W 1.4301)	Product no.	Thread	Overall length	D	D <sub>1</sub>	d	l <sub>1</sub>	e	h	Tail d <sub>r</sub> xU <sub>x</sub> L <sub>r</sub>	Admissible load			
											Axial*	angle		
												30 °	45 °	90 °
		M	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mmxUxmm]	[kN]	[kN]	[kN]	[kN]
BSRF M8x50-SS2	45207	8	50	11	34	7.2	7	8	26	5xUx140	2.5	1.5	1.0	0.6
BSRF M10x50-SS2	45322	10	50	13	34	9.2	11	10	24	6xUx175	3.5	2.0	1.4	0.8
BSRF M12x60-SS2	45357	12	60	16	40	9.2	13	11	28	8xUx300	5.0	3.0	2.2	1.4
BSRF M16x80-SS2	45358	16	80	22	48	12.2	20	14	32	10xUx350	8.5	7.0	6.0	4.3
BSRF M16x100-SS2	45571	16	100	22	48	12.2	20	14	44	10xUx350	10.0	8.0	7.0	5.0
BSRF M16x120-SS2	45648	16	120	22	48	12.2	20	14	53	10xUx350	12.0	8.5	7.5	5.0
BSRF M20x100-SS2	45323	20	100	27	48	14.2	23	18	41	12xUx400	12.5	9.6	9.12	6.25
BSRF M20x120-SS2	45656	20	120	27	48	14.2	23	18	50	12xUx400	14.0	11.0	10.0	7.0
BSRF M24x120-SS2	45572	24	120	32	57	14.2	28	21	55	12xUx400	16.0	12.5	11.0	8.0

BSRF-SS4 (W 1.4404)	Product no.	Thread	Overall length	D	D <sub>1</sub>	d	l <sub>1</sub>	e	h	Tail d <sub>r</sub> xU <sub>x</sub> L <sub>r</sub>	Admissible load			
											Axial*	angle		
												30 °	45 °	90 °
		M	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mmxUxmm]	[kN]	[kN]	[kN]	[kN]
BSRF M8x50-SS4	45208	8	50	11	34	7.2	7	8	26	5xUx140	2.5	1.5	1.0	0.6
BSRF M10x50-SS4	45437	10	50	13	34	9.2	11	10	24	6xUx175	3.5	2.0	1.4	0.8
BSRF M12x60-SS4	45438	12	60	16	40	9.2	13	11	28	8xUx300	5.0	3.0	2.2	1.4
BSRF M16x80-SS4	45439	16	80	22	48	12.2	20	14	32	10xUx350	8.5	7.0	6.0	4.3
BSRF M16x100-SS4	45569	16	100	22	48	12.2	20	14	44	10xUx350	10.0	8.0	7.0	5.0
BSRF M16x120-SS4	45647	16	120	22	48	12.2	20	14	53	10xUx350	12.0	8.5	7.5	5.0
BSRF M20x100-SS4	45440	20	100	27	48	14.2	23	18	41	12xUx400	12.5	9.6	9.12	6.25
BSRF M20x120-SS4	45657	20	120	27	48	14.2	23	18	50	12xUx400	14.0	11.0	10.0	7.0
BSRF M24x120-SS4	45570	24	120	32	57	14.2	28	21	55	12xUx400	16.0	12.5	11.0	8.0

Note: \* working load is valid only if the reinforcing tail is used. Terwa does not supply the tail.

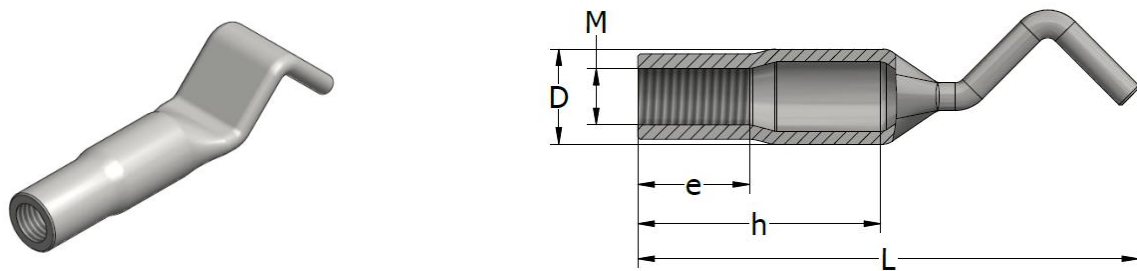
**FIXING INSERTS WITH NAILING PLATE FLAT END WITH CROSS-DRILLED HOLE AND CROSS-PIN – BSRFS**


Fixing inserts BSRFS are manufactured from steel precision tube S235JR NBK galvanised (EV) or from stainless steel tube 1.4301 (SS2) or 1.4404 (SS4). The cross-pin is made from steel bar S235JR. **Do not use these inserts for lifting.**

BSRFS-EV	Product no.	Thread	Overall length	D	D <sub>1</sub>	d	l	l <sub>i</sub>	e	h	Admissible load			
											Axial	angle		
												30 °	45 °	90 °
M	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kN]	[kN]	[kN]	[kN]	
BSRFS M8x50-EV	45554	8	50	11	34	7	50	7	8	26	2.5	1.5	1.0	0.6
BSRFS M10x50-EV	45466	10	50	13	34	9	50	11	10	24	3.5	2.0	1.4	0.8
BSRFS M12x60-EV	45555	12	60	16	40	9	50	13	11	28	5.0	3.0	2.2	1.4
BSRFS M16x80-EV	45472	16	80	22	48	12	80	20	14	32	8.5	7.0	6.0	4.3
BSRFS M16x100-EV	45473	16	100	22	48	12	80	20	14	44	10.0	8.0	7.0	5.0
BSRFS M16x120-EV	45556	16	120	22	48	12	80	20	14	53	12.0	8.5	7.5	5.0
BSRFS M20x100-EV	45474	20	100	27	48	14	100	23	18	41	12.5	9.6	9.12	6.25
BSRFS M20x120-EV	45557	20	120	27	48	14	100	23	18	50	14.0	11.0	10.0	7.0
BSRFS M24x120-EV	45558	24	120	32	57	14	100	28	21	55	16.0	12.5	11.0	8.0

BSRFS-SS2 (W 1.4301)	Product no.	Thread	Overall length	D	D <sub>1</sub>	d	l	l <sub>i</sub>	e	h	Admissible load			
											Axial	angle		
												30 °	45 °	90 °
M	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kN]	[kN]	[kN]	[kN]
BSRFS M8x50-SS2	45564	8	50	11	34	7	50	7	8	26	2.5	1.5	1.0	0.6
BSRFS M10x50-SS2	45359	10	50	13	34	9	50	11	10	24	3.5	2.0	1.4	0.8
BSRFS M12x60-SS2	45360	12	60	16	40	9	50	13	11	28	5.0	3.0	2.2	1.4
BSRFS M16x80-SS2	45361	16	80	22	48	12	80	20	14	32	8.5	7.0	6.0	4.3
BSRFS M16x100-SS2	45565	16	100	22	48	12	80	20	14	44	10.0	8.0	7.0	5.0
BSRFS M16x120-SS2	45566	16	120	22	48	12	80	20	14	53	12.0	8.5	7.5	5.0
BSRFS M20x100-SS2	45362	20	100	27	48	14	100	23	18	41	12.5	9.6	9.12	6.25
BSRFS M20x120-SS2	45567	20	120	27	48	14	100	23	18	50	14.0	11.0	10.0	7.0
BSRFS M24x120-SS2	45568	24	120	32	57	14	100	28	21	55	16.0	12.5	11.0	8.0

BSRFS-SS4 (W 1.4404)	Product no.	Thread	Overall length	D	D <sub>1</sub>	d	l	l <sub>i</sub>	e	h	Admissible load			
											Axial	angle		
												30 °	45 °	90 °
M	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kN]	[kN]	[kN]	[kN]
BSRFS M8x50-SS4	45559	8	50	11	34	7	50	7	8	26	2.5	1.5	1.0	0.6
BSRFS M10x50-SS4	45467	10	50	13	34	9	50	11	10	24	3.5	2.0	1.4	0.8
BSRFS M12x60-SS4	45469	12	60	16	40	9	50	13	11	28	5.0	3.0	2.2	1.4
BSRFS M16x80-SS4	45470	16	80	22	48	12	80	20	14	32	8.5	7.0	6.0	4.3
BSRFS M16x100-SS4	45560	16	100	22	48	12	80	20	14	44	10.0	8.0	7.0	5.0
BSRFS M16x120-SS4	45561	16	120	22	48	12	80	20	14	53	12.0	8.5	7.5	5.0
BSRFS M20x100-SS4	45471	20	100	27	48	14	100	23	18	41	12.5	9.6	9.12	6.25
BSRFS M20x120-SS4	45562	20	120	27	48	14	100	23	18	50	14.0	11.0	10.0	7.0
BSRFS M24x120-SS4	45563	24	120	32	57	14	100	28	21	55	16.0	12.5	11.0	8.0

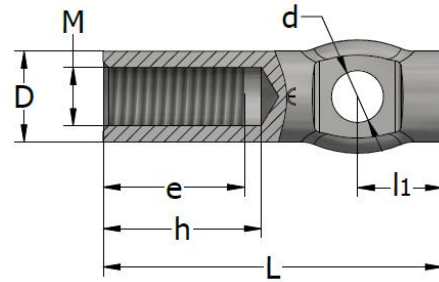
**FIXING INSERTS WITH WAVE END – BSX**


Fixing inserts BSX are manufactured from steel precision tube S235JR NBK hot dip galvanized (TV), electrolytic galvanised EV or from stainless steel tube 1.4404 (SS4). **Do not use these inserts for lifting.**

BSX-TV	Product no.	Thread	Overall Length L	D	e	h	Admissible load
		M	[mm]	[mm]	[mm]	[mm]	[kN]
BSX M10x55-TV	49102	10	55	13	10	20	4.0
BSX M10x75-TV	49104	10	75	13	10	20	5.0
BSX M12x95-TV	49106	12	95	17.2	21	45	6.0
BSX M12x135-TV	45204	12	135	17.2	21	45	7.0
BSX M16x100-TV	49081	16	100	22	30	45	10.0
BSX M16x125-TV	49083	16	125	22	30	45	11.0
BSX M16x135-TV	48894	16	135	22	21	45	12.0
BSX M20x100-TV	49085	20	100	27	30	45	16.0
BSX M20x125-TV	49087	20	125	27	30	45	16.0
BSX M24x120-TV	49108	24	120	32	33	55	16.0
BSX M30x145-TV	49114	30	145	38	36	65	16.0

BSX-EV	Product no.	Thread	Overall Length L	D	e	h	Admissible load
		M	[mm]	[mm]	[mm]	[mm]	[kN]
BSX M12x95-EV	49410	12	95	17.2	21	45	6.0
BSX M12x135-EV	49411	12	135	17.2	21	45	7.0
BSX M16x135-EV	48893	16	135	22	21	45	12.0

BSX-SS4 (W 1.4401)	Product no.	Thread	Overall Length L	D	e	h	Admissible load
		M	[mm]	[mm]	[mm]	[mm]	[kN]
BSX M10x55-SS4	49103	10	55	13	10	20	4.0
BSX M10x75-SS4	49105	10	75	13	10	20	5.0
BSX M12x95-SS4	49107	12	95	17.2	21	45	6.0
BSX M12x135-SS4	45285	12	135	17.2	21	45	7.0
BSX M16x100-SS4	49082	16	100	22	30	45	10.0
BSX M16x125-SS4	49084	16	125	22	30	45	11.0
BSX M16x135-SS4	48892	16	135	22	21	45	12.0
BSX M20x100-SS4	49086	20	100	27	30	45	16.0
BSX M20x125-SS4	49088	20	125	27	30	45	16.0
BSX M24x120-SS4	49109	24	120	32	33	55	16.0
BSX M30x145-SS4	49115	30	145	38	36	65	16.0

**FIXING INSERT WITH CROSS-DRILLED HOLE – HBU**


Fixing inserts HBU are manufactured from steel bar 11SMnPb30 (W 1.0718) galvanised (EV) or from stainless steel bar A2 – 304 / 1.4305 (SS2) or A4-316Ti / 1.4571 (SS4). **Do not use these inserts for lifting.**

HBU-EV	Product no.	Thread	Overall length	D	d	l	e	h	Admissible load
		M	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kN]
HBU M10x50-EV	45504	10	50	14	6.2	13	20	25	3.5
HBU M10x60-EV	45399	10	60	14	6.2	13	20	25	4.0
HBU M12x60-EV	45505	12	60	16	9.2	15	24	28	6.0
HBU M12x70-EV	45400	12	70	16	9.2	15	24	28	7.0
HBU M16x80-EV	45506	16	80	22	10.2	16	30	35	8.0
HBU M16x85-EV	45507	16	85	22	10.2	16	30	35	9.0
HBU M16x100-EV	45401	16	100	22	10.2	16	30	35	13.0
HBU M20x100-EV	45508	20	100	26	12.2	24	35	40	14.0
HBU M20x130-EV	45402	20	130	26	12.2	24	35	40	18.0
HBU M24x120-EV	45509	24	120	32	15.2	32	40	45	18.0
HBU M24x150-EV	45403	24	150	32	15.2	32	40	45	23.0

HBU-SS2 (1.4305)	Product no.	Thread	Overall length	D	d	l	e	h	Admissible load
		M	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kN]
HBU M10x50-SS2	45363	10	50	14	6.2	13	20	25	3.5
HBU M10x60-SS2	45516	10	60	14	6.2	13	20	25	4.0
HBU M12x60-SS2	45365	12	60	16	9.2	15	24	28	6.0
HBU M12x70-SS2	45517	12	70	16	9.2	15	24	28	7.0
HBU M16x80-SS2	45367	16	80	22	10.2	16	30	35	8.0
HBU M16x85-SS2	45518	16	85	22	10.2	16	30	35	9.0
HBU M16x100-SS2	45519	16	100	22	10.2	16	30	35	13.0
HBU M20x100-SS2	45369	20	100	26	12.2	24	35	40	14.0
HBU M20x130-SS2	45520	20	130	26	12.2	24	35	40	18.0
HBU M24x120-SS2	45371	24	120	32	15.2	32	40	45	18.0
HBU M24x150-SS2	45521	24	150	32	15.2	32	40	45	23.0

HBU-SS4 (1.4571)	Product no.	Thread	Overall length	D	d	l	e	h	Admissible load
		M	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kN]
HBU M10x50-SS4	45364	10	50	14	6.2	13	20	25	3.5
HBU M10x60-SS4	45510	10	60	14	6.2	13	20	25	4.0
HBU M12x60-SS4	45366	12	60	16	9.2	15	24	28	6.0
HBU M12x70-SS4	45511	12	70	16	9.2	15	24	28	7.0
HBU M16x80-SS4	45368	16	80	22	10.2	16	30	35	8.0
HBU M16x85-SS4	45512	16	85	22	10.2	16	30	35	9.0
HBU M16x100-SS4	45513	16	100	22	10.2	16	30	35	13.0
HBU M20x100-SS4	45370	20	100	26	12.2	24	35	40	14.0
HBU M20x130-SS4	45514	20	130	26	12.2	24	35	40	18.0
HBU M24x120-SS4	45372	24	120	32	15.2	32	40	45	18.0
HBU M24x150-SS4	45515	24	150	32	15.2	32	40	45	23.0



**FIXING INSERT WITH CROSS-DRILLED HOLE AND CROSS-PIN – HBUS**


Fixing inserts HBUS are manufactured from steel bar 11SMnPb30 (W 1.0718) galvanised (EV) or from stainless steel bar A2 – 304 / 1.4305 (SS2) or A4-316Ti / 1.4571 (SS4). The cross-pin is made from steel bar S235JR. **Do not use these inserts for lifting.**

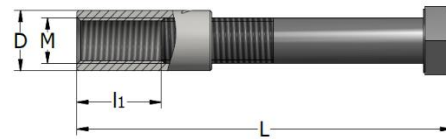
HBUS-EV	Product no.	Thread M	Overall length [mm]	D [mm]	l <sub>1</sub> [mm]	e [mm]	h [mm]	Cross-pin		Admissible load [kN]
								d [mm]	l [mm]	
HBUS M10x50-EV	45486	10	50	14	13	20	25	6	50	3.5
HBUS M10x60-EV	45462	10	60	14	13	20	25	6	50	4.0
HBUS M12x60-EV	45487	12	60	16	15	24	28	9	50	6.0
HBUS M12x70-EV	45463	12	70	16	15	24	28	9	50	7.0
HBUS M16x80-EV	45488	16	80	22	16	30	35	10	80	8.0
HBUS M16x85-EV	45489	16	85	22	16	30	35	10	80	9.0
HBUS M16x100-EV	45320	16	100	22	16	30	35	10	80	13.0
HBUS M20x100-EV	45490	20	100	26	24	35	40	12	80	14.0
HBUS M20x130-EV	45465	20	130	26	24	35	40	12	80	18.0
HBUS M24x120-EV	45491	24	120	32	32	40	45	15	100	18.0
HBUS M24x150-EV	45398	24	150	32	32	40	45	15	100	23.0

HBUS-SS2 (1.4305)	Product no.	Thread M	Overall length [mm]	D [mm]	l <sub>1</sub> [mm]	e [mm]	h [mm]	Cross-pin		Admissible load [kN]
								d [mm]	l [mm]	
HBUS M10x50-SS2	45321	10	50	14	13	20	25	6	50	3.5
HBUS M10x60-SS2	45498	10	60	14	13	20	25	6	50	4.0
HBUS M12x60-SS2	45374	12	60	16	15	24	28	9	50	6.0
HBUS M12x70-SS2	45499	12	70	16	15	24	28	9	50	7.0
HBUS M16x80-SS2	45376	16	80	22	16	30	35	10	80	8.0
HBUS M16x85-SS2	45500	16	85	22	16	30	35	10	80	9.0
HBUS M16x100-SS2	45501	16	100	22	16	30	35	10	80	13.0
HBUS M20x100-SS2	45378	20	100	26	24	35	40	12	80	14.0
HBUS M20x130-SS2	45502	20	130	26	24	35	40	12	80	18.0
HBUS M24x120-SS2	45380	24	120	32	32	40	45	15	100	18.0
HBUS M24x150-SS2	45503	24	150	32	32	40	45	15	100	23.0

HBUS-SS4 (1.4571)	Product no.	Thread M	Overall length [mm]	D [mm]	l <sub>1</sub> [mm]	e [mm]	h [mm]	Cross-pin		Admissible load [kN]
								d [mm]	l [mm]	
HBUS M10x50-SS4	45373	10	50	14	13	20	25	6	50	3.5
HBUS M10x60-SS4	45492	10	60	14	13	20	25	6	50	4.0
HBUS M12x60-SS4	45375	12	60	16	15	24	28	9	50	6.0
HBUS M12x70-SS4	45493	12	70	16	15	24	28	9	50	7.0
HBUS M16x80-SS4	45377	16	80	22	16	30	35	10	80	8.0
HBUS M16x85-SS4	45494	16	85	22	16	30	35	10	80	9.0
HBUS M16x100-SS4	45495	16	100	22	16	30	35	10	80	13.0
HBUS M20x100-SS4	45379	20	100	26	24	35	40	12	80	14.0
HBUS M20x130-SS4	45496	20	130	26	24	35	40	12	80	18.0
HBUS M24x120-SS4	45381	24	120	32	32	40	45	15	100	18.0
HBUS M24x150-SS4	45497	24	150	32	32	40	45	15	100	23.0

## FIXING ANCHORS

### FIXING ANCHOR – BBB



These fixing systems consist of a threaded bush locked on a standard bolt. The threaded bush is manufactured from steel S355JO (yield strength min. 355 MPa) galvanic protected (EV) or hot-dipped galvanised (TV); the bolt is manufactured from steel group 8.8. The threaded bush can also be made of stainless-steel W 1.4571 –AISI 316Ti (SS4). **Do not use these fixing anchors for lifting.**

BBB-EV	Product no.	Thread M	Overall length [mm]	l <sub>1</sub> [mm]	D [mm]	Admissible load		Bolt
						25 MPa [kN]	45 MPa [kN]	
BBB M12x90-EV	63447	12	90	22	16	18	24	M12x60
BBB M12x100-EV	63448	12	100	22	16	18	24	M12x70
BBB M12x150-EV	63449	12	150	22	16	18	24	M12x120
BBB M16x140-EV	63459	16	140	30	22	27	46	M16x100
BBB M16x220-EV	63460	16	220	30	22	27	46	M16x180
BBB M20x140-EV	63468	20	140	35	26	37	50	M20x90
BBB M20x150-EV	63469	20	150	35	26	37	50	M20x100
BBB M20x180-EV	63470	20	180	35	26	42	59	M20x130
BBB M20x270-EV	63471	20	270	35	26	42	59	M20x220
BBB M24x200-EV	63482	24	200	45	32	58	78	M24x140
BBB M24x320-EV	63483	24	320	45	32	60	96	M24x260
BBB M30x240-EV	63489	30	240	60	40	76	102	M30x160
BBB M30x380-EV	63490	30	380	60	40	102	150	M30x300
BBB M36x300-EV	63497	36	300	74	48	106	143	M36x200
BBB M36x420-EV	63498	36	420	74	48	145	215	M36x320
BBB M42x300-EV	63503	42	300	70	54	105	140	M42x200
BBB M42x460-EV	63504	42	460	70	54	205	250	M42x360

BBB-EV / SHORT	Product no.	Thread M	Overall length [mm]	l <sub>1</sub> [mm]	D [mm]	Admissible load		Bolt
						25 MPa [kN]	45 MPa [kN]	
BBB M12x55-EV	63446	12	55	22	16	9	13	M12x25
BBB M16x75-EV	63458	16	75	30	22	13	23	M16x35
BBB M20x90-EV	63467	20	90	35	26	18	25	M20x40
BBB M30x150-EV	63488	30	150	60	40	38	51	M30x70

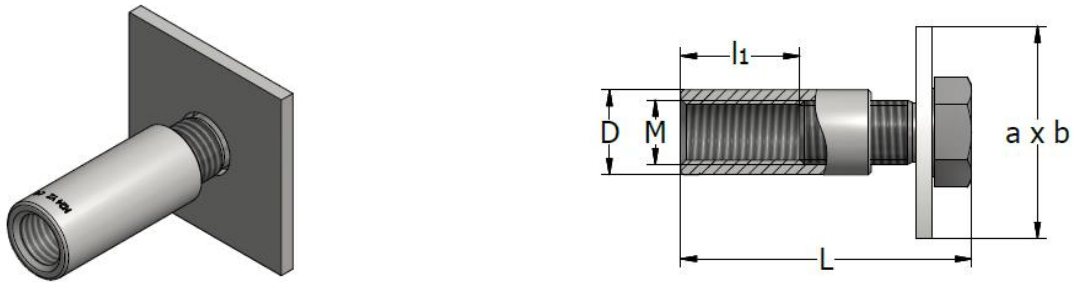
BBB-TV	Product no.	Thread M	Overall length [mm]	l <sub>1</sub> [mm]	D [mm]	Admissible load		Bolt
						25 MPa [kN]	45 MPa [kN]	
BBB M12x90-TV	63455	12	90	22	16	18	24	M12x60
BBB M12x100-TV	63456	12	100	22	16	18	24	M12x70
BBB M12x150-TV	63457	12	150	22	16	18	24	M12x120
BBB M16x140-TV	63465	16	140	30	22	27	46	M16x100
BBB M16x220-TV	63466	16	220	30	22	27	46	M16x180
BBB M20x140-TV	63478	20	140	35	26	37	50	M20x90
BBB M20x150-TV	63479	20	150	35	26	37	50	M20x100
BBB M20x180-TV	63480	20	180	35	26	42	58	M20x130
BBB M20x270-TV	63481	20	270	35	26	42	58	M20x220
BBB M24x200-TV	63486	24	200	45	32	58	78	M24x140
BBB M24x320-TV	63487	24	320	45	32	60	96	M24x260
BBB M30x240-TV	63495	30	240	60	40	76	102	M30x160
BBB M30x380-TV	63496	30	380	60	40	102	150	M30x300
BBB M36x300-TV	63501	36	300	74	48	106	143	M36x200
BBB M36x420-TV	63502	36	420	74	48	145	215	M36x320
BBB M42x300-TV	63507	42	300	70	54	105	140	M42x200
BBB M42x460-TV	63508	42	460	70	54	205	250	M42x360



BBB-TV / SHORT	Product no.	Thread	Overall length	l <sub>1</sub>	D	Admissible load		Bolt
						25 MPa	45 MPa	
		M	[mm]	[mm]	[mm]	[kN]	[kN]	
BBB M12x55-TV	63454	12	55	22	16	9	13	M12x25
BBB M16x75-TV	63464	16	75	30	22	13	23	M16x35
BBB M20x90-TV	63477	20	90	35	26	18	25	M20x40
BBB M30x150-TV	63494	30	150	60	40	38	51	M30x70

BBB-SS (W 1.4571)	Product no.	Thread	Overall length	l <sub>1</sub>	D	Admissible load		Bolt
						25 MPa	45 MPa	
		M	[mm]	[mm]	[mm]	[kN]	[kN]	type
BBB M12x90-SS4	63451	12	90	22	16	18	24	M12x60
BBB M12x100-SS4	63452	12	100	22	16	18	24	M12x70
BBB M12x150-SS4	63453	12	150	22	16	18	24	M12x120
BBB M16x140-SS4	63462	16	140	30	22	27	46	M16x100
BBB M16x220-SS4	63463	16	220	30	22	27	46	M16x180
BBB M20x140-SS4	63473	20	140	35	26	37	50	M20x90
BBB M20x150-SS4	63474	20	150	35	26	37	50	M20x100
BBB M20x180-SS4	63475	20	180	35	26	42	58	M20x130
BBB M20x270-SS4	63476	20	270	35	26	42	58	M20x220
BBB M24x200-SS4	63484	24	200	45	32	58	78	M24x140
BBB M24x320-SS4	63485	24	320	45	32	60	96	M24x260
BBB M30x240-SS4	63492	30	240	60	40	76	102	M30x160
BBB M30x380-SS4	63493	30	380	60	40	102	150	M30x300
BBB M36x300-SS4	63499	36	300	74	48	106	143	M36x200
BBB M36x420-SS4	63500	36	420	74	48	145	215	M36x320
BBB M42x300-SS4	63505	42	300	70	54	105	140	M42x200
BBB M42x460-SS4	63506	42	460	70	54	205	250	M42x360

BBB-SS SHORT (W1.4571)	Product no.	Thread	Overall length	l <sub>1</sub>	D	Admissible load		Bolt
						25 MPa	45 MPa	
		M	[mm]	[mm]	[mm]	[kN]	[kN]	type
BBB M12x55-SS4	63450	12	55	22	16	9	13	M12x25
BBB M16x75-SS4	63461	16	75	30	22	13	23	M16x35
BBB M20x90-SS4	63472	20	90	35	26	18	25	M20x40
BBB M30x150-SS4	63491	30	150	60	40	38	51	M30x70

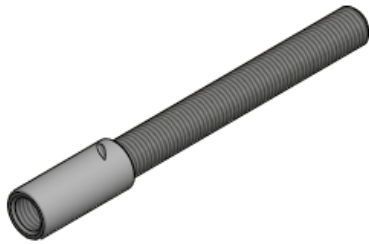
**FIXING BOLT ANCHOR – BBP**


Fixing bolt anchor BBP consists of a threaded bush locked on a standard bolt and an anchor plate. The threaded bush is manufactured from steel S355JO, electrolytic galvanised (EV) or hot-dipped galvanised (TV); the bolt is made of steel 8.8 with no coating and the plate is manufactured from steel S235, also with no coating. The threaded bush can also be made of stainless-steel W 1.4571 –AISI 316Ti (SS4).

BBP-EV	Product no.	Thread	Overall length L	$l_1$	D	a	b	Admissible load [kN]	Screw
		M	[mm]	[mm]	[mm]	[mm]	[mm]		
BBP M12x55-EV	63538	12	55	22.5	16	40	40	8	M12x25
BBP M16x75-EV	63541	16	75	30	22	50	50	14	M16x35
BBP M20x90-EV	63544	20	90	37.5	26	60	60	17	M20x40
BBP M24x110-EV	63547	24	110	45	32	80	80	20	M24x50
BBP M30x140-EV	63550	30	140	61	40	100	100	30	M30x60

BBP-TV	Product no.	Thread	Overall length L	$l_1$	D	a	b	Admissible load [kN]	Screw
		M	[mm]	[mm]	[mm]	[mm]	[mm]		
BBP M12x55-TV	63540	12	55	22.5	16	40	40	8	M12x25
BBP M16x75-TV	63543	16	75	30	22	50	50	14	M16x35
BBP M20x90-TV	63546	20	90	37.5	26	60	60	17	M20x40
BBP M24x110-TV	63549	24	110	45	32	80	80	20	M24x50
BBP M30x140-TV	63552	30	140	61	40	100	100	30	M30x60

BBP-SS (W 1.4571)	Product no.	Thread	Overall length L	$l_1$	D	a	b	Admissible load [kN]	Screw
		M	[mm]	[mm]	[mm]	[mm]	[mm]		
BBP M12x55-SS4	63539	12	55	22.5	16	40	40	8	M12x25
BBP M16x75-SS4	63542	16	75	30	22	50	50	14	M16x35
BBP M20x90-SS4	63545	20	90	37.5	26	60	60	17	M20x40
BBP M24x110-SS4	63548	24	110	45	32	80	80	20	M24x50
BBP M30x140-SS4	63551	30	140	61	40	100	100	30	M30x60

**FIXING ANCHOR – SB**


These fixing systems consist of a threaded bush locked on a threaded bar (untreated). The threaded bush is manufactured from steel S355JO (yield strength min. 355 MPa) galvanic protected (EV) or hot-dipped galvanised (TV); the threaded bar is manufactured from steel group 8.8. The threaded bush can also be made of stainless steel W1.4571 –AISI 316Ti (SS4). **Do not use these fixing anchors for lifting.**

SB-EV	Product no.	Thread	Overall length	l <sub>1</sub>	D	Admissible load	As
						$N_{Rk,S}$	Stress area of threaded bush
		M	[mm]	[mm]	[mm]	[kN]	[mm <sup>2</sup> ]
SB-M12-400-EV	65283	12	400	22	16	24	88
SB-M12-600-EV	65284	12	600	22	16	24	88
SB-M16-550-EV	65285	16	550	30	22	49	179
SB-M20-700-EV	65286	20	700	35	26	59	216

SB-TV	Product no.	Thread	Overall length	l <sub>1</sub>	D	Admissible load	As
						$N_{Rk,S}$	Stress area of threaded bush
		M	[mm]	[mm]	[mm]	[kN]	[mm <sup>2</sup> ]
SB-M12-400-TV	65287	12	400	22	16	24	88
SB-M12-600-TV	65288	12	600	22	16	24	88
SB-M16-550-TV	65289	16	550	30	22	49	179
SB-M20-700-TV	65290	20	700	35	26	59	216

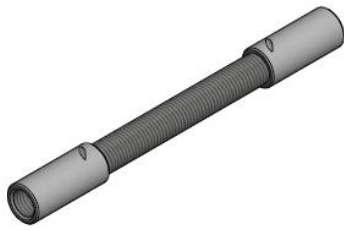
SB-SS4 (W 1.4571)	Product no.	Thread	Overall length	l <sub>1</sub>	D	Admissible load	As
						$N_{Rk,S}$	Stress area of threaded bush
		M	[mm]	[mm]	[mm]	[kN]	[mm <sup>2</sup> ]
SB-M12-400-SS4	65291	12	400	22	16	24	88
SB-M12-600-SS4	65292	12	600	22	16	24	88
SB-M16-550-SS4	65293	16	550	30	22	49	179
SB-M20-700-SS4	65294	20	700	35	26	59	216

**Note:**

Admissible loads are for tension and the maximum values for steel of the threaded bush.

**The load capacity of the SB anchor embedded in concrete has to be checked for compliance with EN 1992-1-1, chapter 8.4.**

The required bonding strength depends mainly on the strength class of the concrete and has to be verified.

**FIXING ANCHOR – SB-SB**


These fixing systems consist of a threaded bar (untreated) and two threaded bushes locked on both ends. The threaded bush is manufactured from steel S355JO (yield strength min. 355 MPa) galvanic protected (EV) or hot-dipped galvanised (TV); the threaded bar is manufactured from steel group 8.8. The threaded bush can also be made of stainless steel W1.4571 –AISI 316Ti (SS4). **Do not use these fixing anchors for lifting.**

This product is made on request. The tables below only specify the minimum values for overall length. Please specify the required length in the order.

SB-SB-EV	Product no.	Thread	Minimum length	l <sub>1</sub>	D	Admissible load	As
						$N_{Rk,S}$	Stress area of threaded bush
		M	[mm]	[mm]	[mm]	[kN]	[mm <sup>2</sup> ]
SB-SB-M12-200-EV	65295	12	200	22	16	24	88
SB-SB-M16-200-EV	65296	16	200	30	22	49	179
SB-SB-M20-200-EV	65297	20	200	35	26	59	216
SB-SB-M24-200-EV	65298	24	200	45	32	96	351
SB-SB-M30-220-EV	65299	30	220	60	40	150	550
SB-SB-M36-250-EV	65300	36	250	74	48	215	791
SB-SB-M42-300-EV	65301	42	300	70	54	250	904

SB-SB-TV	Product no.	Thread	Minimum length	l <sub>1</sub>	D	Admissible load	As
						$N_{Rk,S}$	Stress area of threaded bush
		M	[mm]	[mm]	[mm]	[kN]	[mm <sup>2</sup> ]
SB-SB-M12-200-TV	65302	12	200	22	16	24	88
SB-SB-M16-200-TV	65303	16	200	30	22	49	179
SB-SB-M20-200-TV	65304	20	200	35	26	59	216
SB-SB-M24-200-TV	65305	24	200	45	32	96	351
SB-SB-M30-220-TV	65306	30	220	60	40	150	550
SB-SB-M36-250-TV	65307	36	250	74	48	215	791
SB-SB-M42-300-TV	65308	42	300	70	54	250	904

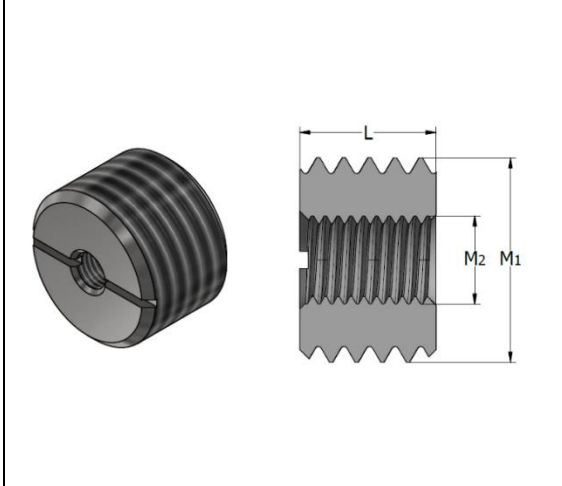
SB-SB-SS4 (W 1.4571)	Product no.	Thread	Minimum length	l <sub>1</sub>	D	Admissible load	As
						$N_{Rk,S}$	Stress area of threaded bush
		M	[mm]	[mm]	[mm]	[kN]	[mm <sup>2</sup> ]
SB-SB-M12-200-SS4	65309	12	200	22	16	24	88
SB-SB-M16-200-SS4	65310	16	200	30	22	49	179
SB-SB-M20-200-SS4	65311	20	200	35	26	59	216
SB-SB-M24-200-SS4	65312	24	200	45	32	96	351
SB-SB-M30-220-SS4	65313	30	220	60	40	150	550

**Note:**

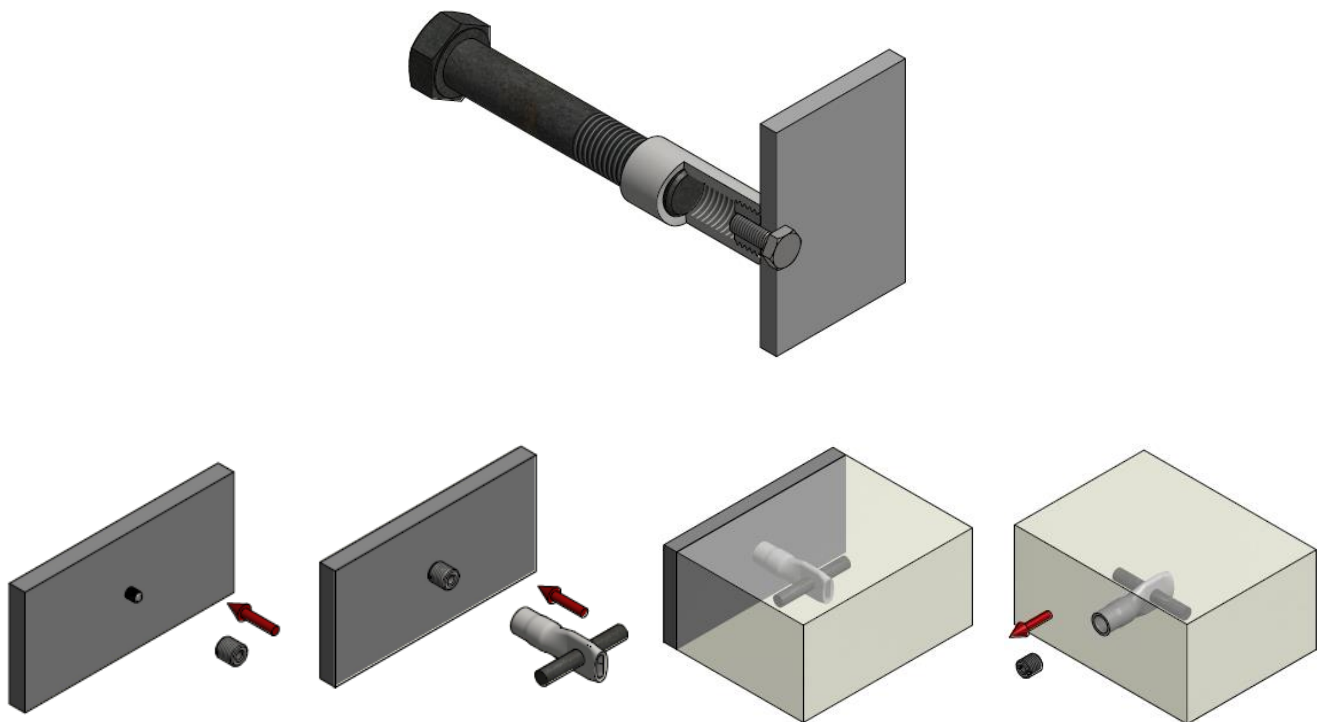
Admissible loads are for tension and the maximum values for steel of the threaded bush.

**The load capacity of the SB anchor embedded in concrete has to be checked for compliance with EN 1992-1-1, chapter 8.4.**  
 The required bonding strength depends mainly on the strength class of the concrete and has to be verified.

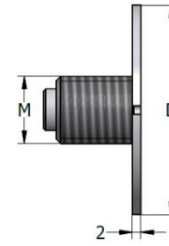
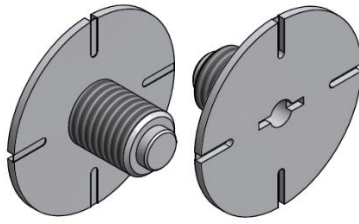
**FIXING ACCESSORIES**
**DOUBLE METRIC MOUNTING PLUG-SN**

	SN	Product no.	Thread	Thread	H
			M1	M2	[mm]
	SN M12-M6	45214	12	6	16
	SN M16-M8	45215	16	8	16
	SN M20-M8	45216	20	8	16
	SN M24-M8	46303	24	8	16
	SN M24-M10	45217	24	10	16
	SN M30-M10	45218	30	10	16
	SN M30-M8	46079	30	8	16
	SN M36-M10	45219	36	10	25
	SN M42-M10	45220	42	10	30
	SN M48-M10	45464	48	10	36
	SN M48-M12	46525	48	12	36
	SN M48-M16	46524	48	16	36

The double metric mounting plug SN is used for fixing the anchors or the lifting sockets to the formwork with a screw.



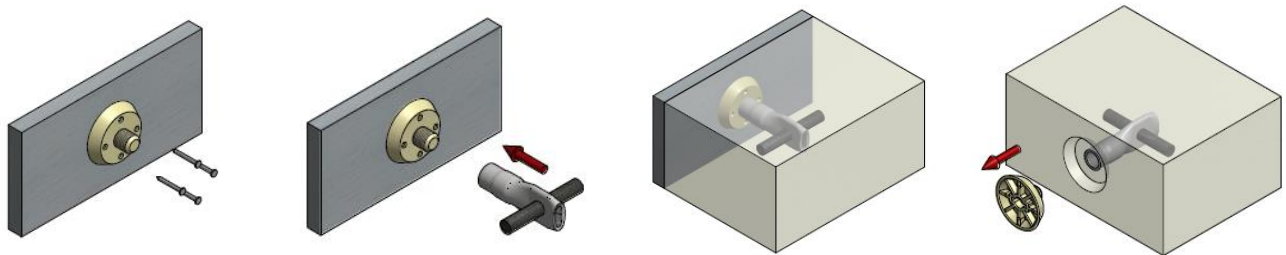
## PLASTIC NAILING PLATE KU-02



Nailing plates KU-02 are used for affixing the anchors and the lifting sockets to the formwork with nails. These are suitable for affixing the anchors or the lifting sockets to the surface of the concrete units.

KU-02	Product no.	Thread	Diam. D	Thickness
		M	[mm]	[mm]
KU-02-M8	62485	M8	50	2
KU-02-M10	47112	M10	50	2
KU-02-M12	46050	M12	50	2
KU-02-M16	47113	M16	50	2
KU-02-M20	47114	M20	50	2
KU-02-M24	47115	M24	50	2

Plastic nailing plates KU-02 and KU-10 are nailed to the formwork. Using forming wax on the nailing plate makes it easier to remove and screw on an anchor or fixing insert. The anchor must be fastened to the reinforcement by suitable means so that it does not move during concreting. After stripping, unscrew.



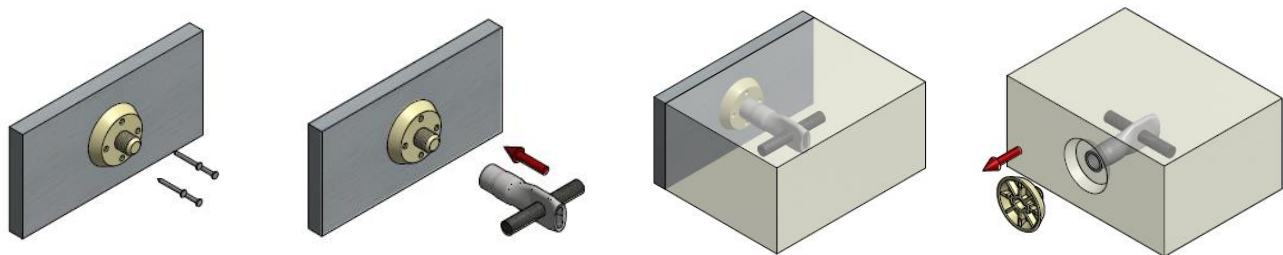
## PLASTIC NAILING PLATE KU-10

Nailing plates KU-10 are used for affixing the anchors and the lifting sockets to the formwork with nails. The fixing flange ensures a minimal recess around the head of the anchor. The recess is filled with fine concrete for protection against corrosion.



KU-10	Product no.	Thread	Diam. D	Diam. d	s	Colour
		M	[mm]	[mm]	[mm]	
KU-10-M8	47116	8	47	37	10	Yellow RAL 1026
KU-10-M10	47117	10	47	37	10	White RAL 9003
KU-10-M12	63246	12	47	37	10	Red RAL 3020
KU-10-M16	63256	16	47	37	10	Grey RAL 7043
KU-10-M20	63257	20	60	50	10	Green RAL 6024
KU-10-M24	63258	24	60	50	10	Blue RAL 5017
KU-10-M30	63259	30	73	63	10	Light grey RAL 7004
KU-10-M36	63260	36	73	63	10	Orange RAL 2009
KU-10-M42	63261	42	96	86	12	Yellow RAL 1023

Plastic nailing plates KU-02 and KU-10 are nailed to the formwork. Using forming wax on the nailing plate makes it easier to remove and screw on an anchor or fixing insert. The anchor must be fastened to the reinforcement by suitable means so that it does not move during concreting. After stripping, unscrew.

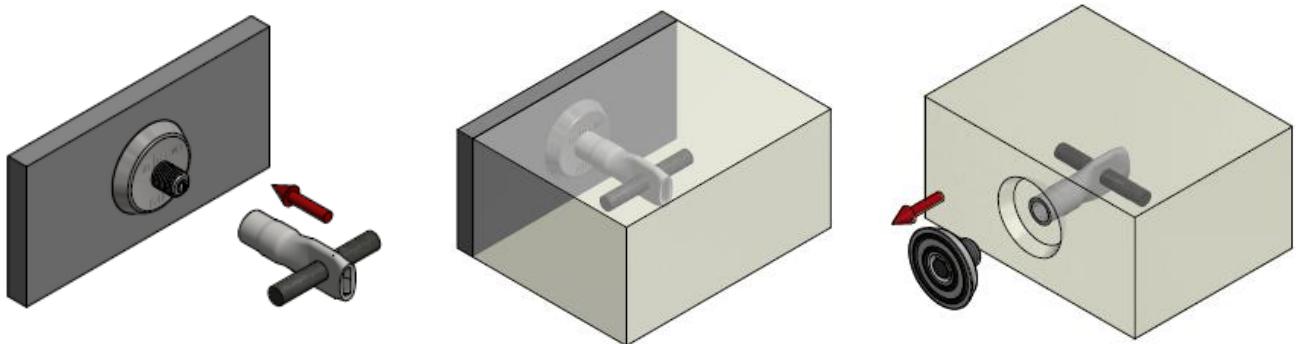


## STEEL MAGNETIC PLATE - TPM

The plates with TPM are used for affixing the anchors and the lifting sockets to the steel formwork. The fixing flange ensures a minimum recess around the head of the anchor. When using this magnetic recess former, it is very important that the surface of the formwork is clean. The recess is filled with fine concrete for protection against corrosion.



TPM-10	Product no.	Thread	Diam. D	s
		M	[mm]	[mm]
TPM-10-M12	63867	12	47	10
TPM-10-M16	63868	16	47	10
TPM-10-M20	63869	20	60	10
TPM-10-M24	63870	24	60	10
TPM-10-M30	63871	30	73	10
TPM-10-M36	63872	36	73	10
TPM-10-M42	63873	42	96	12



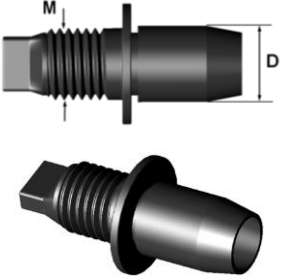


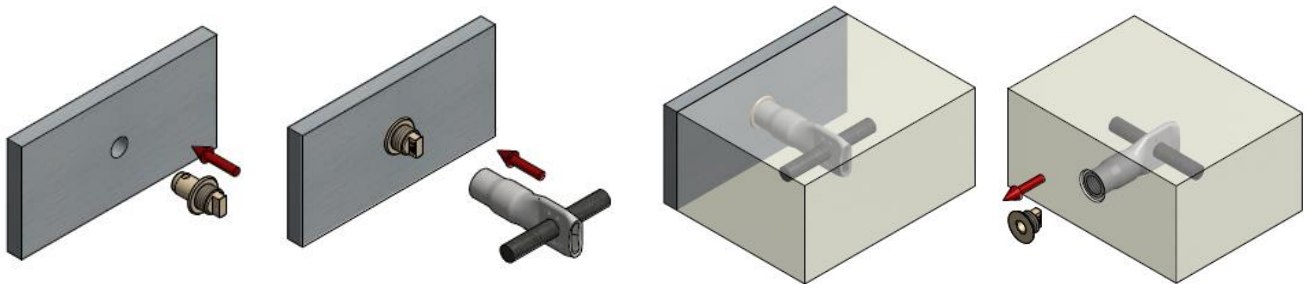
## BREAKABLE FIXING PIN – TBP

The breakable fixing pin is used for affixing the anchors or the lifting sockets to the formwork. The breakable fixing pin TBP is made of plastic nylon or polyamide 6.

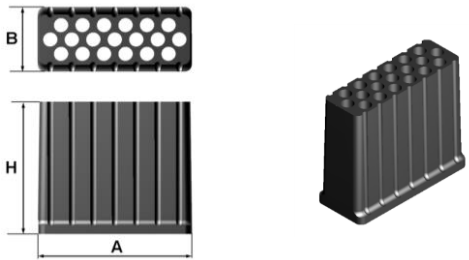
Working method:

- Insert the breakable fixing pin TBP into the formwork
- Screw the anchor or the fixing insert onto the fixing pin TBP
- Pour concrete
- Remove the formwork; the fixing pin will break off in the formwork
- Remove the remaining part of the fixing pin just before using the thread of the anchor

	<b>TBP</b>	<b>Product no.</b>	<b>Thread</b>	<b>D</b>
			<b>M</b>	<b>[mm]</b>
	TBP-M6	45649	6	11
	TBP-M8	45650	8	11
	TBP-M10	45651	10	11
	TBP-M12	45652	12	11
	TBP-M16	45653	16	17
	TBP-M20	45654	20	17
	TBP-M24	45655	24	17



### FIXING BLOCK – TFB

	<b>TFB</b>	<b>Product no.</b>	<b>A</b>	<b>B</b>	<b>H</b>
			[mm]	[mm]	[mm]
	TFB-1437	46274	37	14	30
	TFB-1843	46275	43	18	37

**Fixing block TFB:**

- Is used for securing door posts, banisters and the like in concrete
- Can be mounted on the formwork using securing pins (only in two outer holes!)
- Drilling Ø7 mm holes

## CONTACT



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