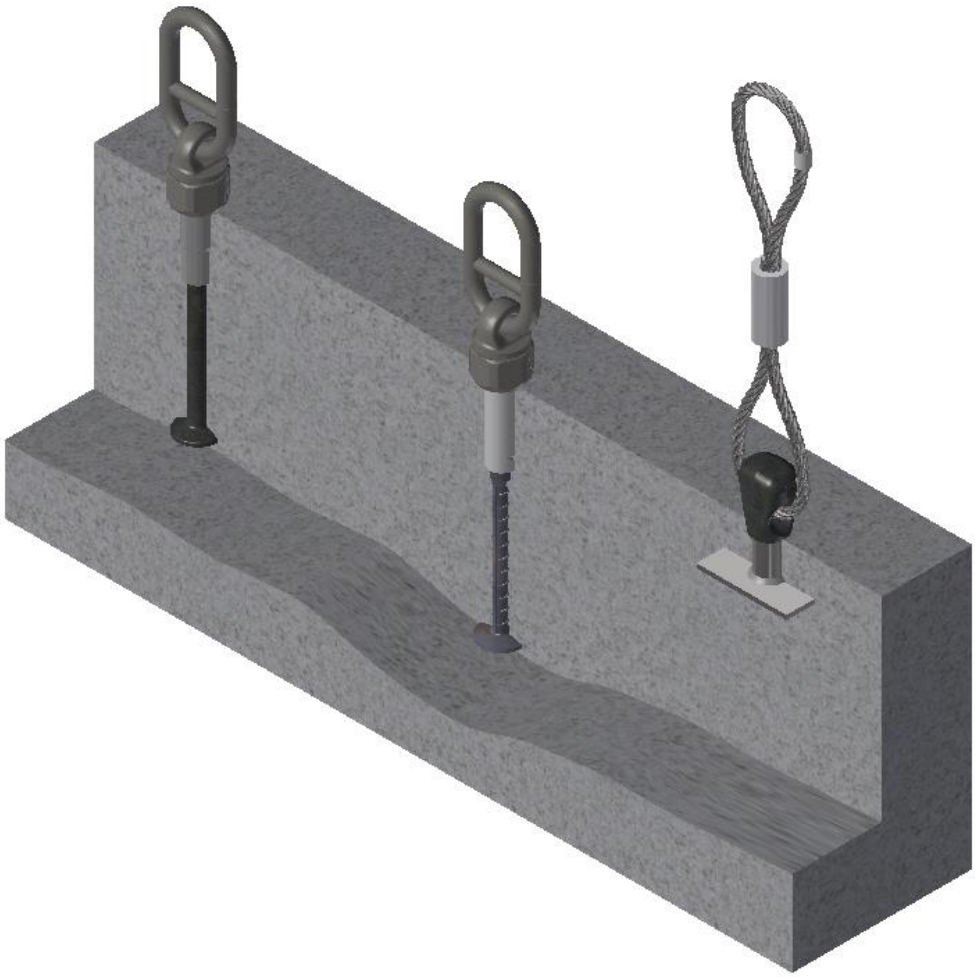
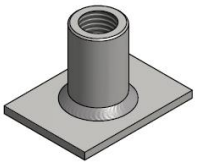
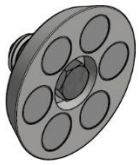
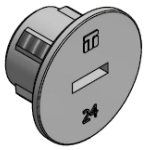
1D-HD THREAD LIFTING SYSTEMS



WWW.TERWA.COM

OVERVIEW

LIFTING SYSTEMS		
THS1  Page 27	**THS3-HD**  Page 29	
LIFTING AND TRANSPORT ANCHORS		
HBS  Page 16	**HBS–With Barrier**  Page 18	**HSP-HD**  Page 24
FIXING ACCESORIES		
SN  Page 32	**KU-10**  Page 33	**TPM**  Page 34
TBP  Page 34	**DATA CLIP**  Page 35	**PLASTIC PLUG**  Page 36
TP-02  Page 37	**TP-10**  Page 38	

CONTENTS:

INTRODUCTION

HD Thread-lifting systems are used in the precast industry and are suitable for lifting, transportation and installation of precast concrete elements on site.
Some of the advantages of this system are:

- a wide range of lifting sockets,
- possibility to establish a connection in a simple and safe manner,
- The lifting systems can be re-used,
- CE conform system. All Terwa lifting systems are CE marked which guarantees the alignment to the European regulations.

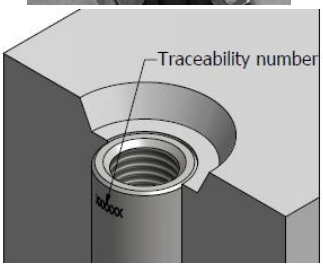
The Thread-lifting system combines a lifting anchor embedded in concrete unit and a lifting device.
The design for Terwa threaded lifting anchors and technical instructions are according to the national German rule VDI/BV-BS6205 "Lifting inserts and lifting insert for precast concrete elements". Also, based on this rule the lifting systems must ensure that they have enough strength to avoid the concrete failure.

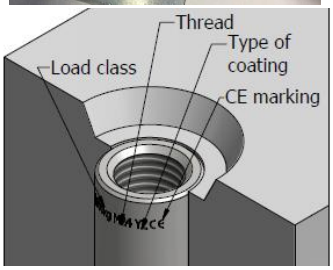
HD LIFTING SYSTEMS

- **RE-USABLE LIFTING SYSTEM AND TRANSPORT ANCHORS**
  - T-tail anchors with pressed socket;
  - Socket welded to a plate;
  - Anchor made from a socket swaged to a standard screw for thin units;
  - HD Lifting systems;
  - Different accessories for recess forming or fixing of inserts on formwork.

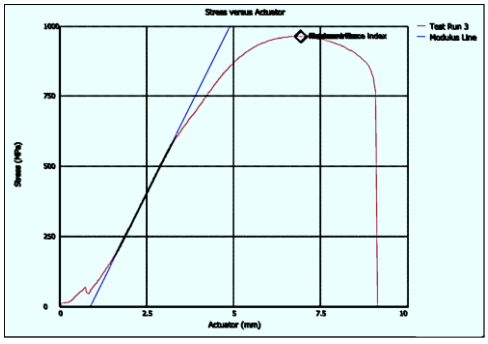
Quality
Terwa control all the time the production process for the anchors from strength, dimensional, material quality point of views and all the required inspections for a superior quality system. All the products are tracked starting from the material acquisition to the final product, ready to be used.

Marking and traceability
All anchors and lifting clutches are CE marked and haves all necessary dates for traceability, thread type and load class.





Anchor testing
Terwa lifting anchors are designed to resist at a minimum safety factor of **3xload group**



CE MARKING

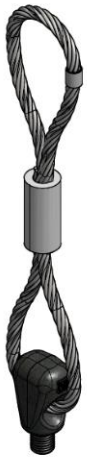
CE marking means that a product is produced and controlled in accordance with a harmonized European standard (hEN) or a European Technical Approval (ETA). ETA can be used as basis for CE marking in cases where no harmonized EN standard is available. However, ETA is voluntary and not required by EU directives or legislation.

Manufacturers may use CE marking to declare that their construction products meet harmonized European standards or have been granted ETA Approvals. These documents define properties the products must have to be granted the right to use CE marking and describe how the manufacture of these products is supervised and tested.

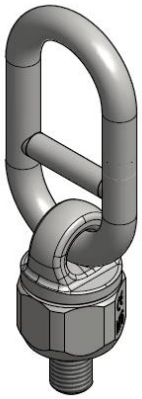
EU's Construction Products Regulation takes effect in full on 1 July 2013. Detailed building parts, such as connections used in concrete constructions, do not have any harmonized EN standards, excluding lifting items and devices, which are regulated in the EU Machinery Directive. For steel constructions CE marking, will become mandatory as of 1 July 2014, as regulated in the EU Construction Products Directive.

GENERAL GUIDANCE FOR LIFTING THS1 and THS3

Ensure that the concrete has at least 15 MPa strength before start lifting.
For positioning the inserts always check the permitted edge distances and spacing between inserts.
We recommend restricting the lift angle to a maximum of 30° when an angled lift is necessary.
For a proper choosing of lifting system consider how frequently the precast unit is going to be lifted.
The cast in threaded elements (anchors or fixing inserts) can be flush or recessed for corrosion protection.
This recess is filled with fine concrete after use.
All the HD Lifting Systems are tested before delivery under a test load three times the working load (individual test for THS1 and THS3).



THS1



THS3

TECHNICAL INFORMATION – CHOOSING THE TYPE OF ANCHOR

INTRODUCTION

Terwa has 3 types of lifting systems:

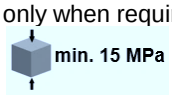
- 1D Threaded lifting system
- 2D Strip anchor lifting system
- 3D T slot anchor lifting system

For all these types the way of choosing the anchor is identical and it depends on the way of lifting and/or experience is the reason of chosing one of the mentioned types.

The1D Threaded lifting system is mainly used when the hoisting angles are limited, while the 2D Strip anchor lifting system and the 3D T slot anchor lifting system can be used for all hoisting angles with a small limitation for the 2D Strip anchor lifting system. The difference between the 2D Strip anchor lifting system and the 3D T slot anchor lifting system is mainly caused by the experience in using the one or the other system.
For the calculation of the anchors Terwa also has software for this, with which calculations can be made.

SAFETY RULES

The lifting system consists of a threaded anchor embedded in concrete and a threaded lifting device. The threaded lifting loop is connected to the anchor only when required for lifting. **Ensure that the concrete has reached at least 15 MPa strength before starting the lifting.**



These lifting systems are not suitable for severe re-use.
In designing the lifting system, it is essential to use the following safety factors against breaking:

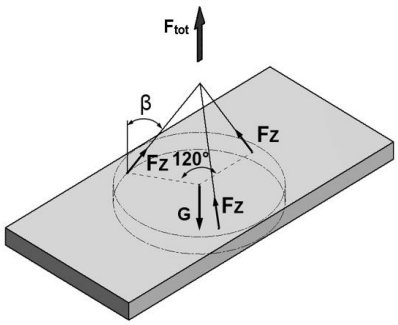
- **for steel component** **c = 3**
- **for concrete element** **c = 2.5**
- **for steel wires** **c = 4**

The maximum load permitted on the components quoted in the tables has been obtained by applying a safety factor on test data.

ANCHORS LIFTING CONDITIONS

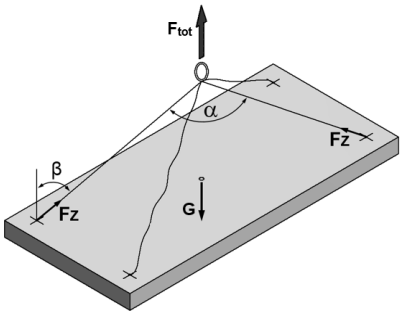
Using three anchors arranged at the same length on from each other like in the figure, can be assumed three load bearing anchors.

Load bearing anchors:
n=3



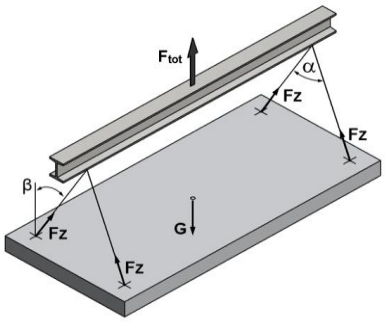
Using four anchors lifted without a spreader beam, only two anchors can be assumed load bearing anchors.

Load bearing anchors:
n=2



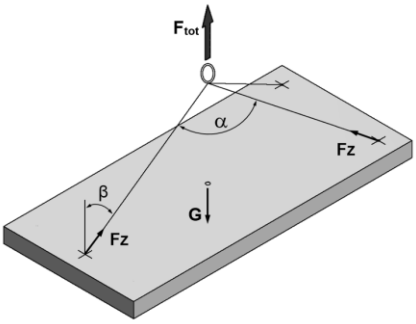
A perfect force distribution is assumed using a spreader beam.

Load bearing anchors:
n=4



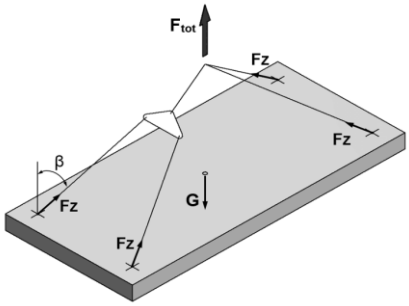
If the anchors are positioning asymmetrically only two bearing anchors can be assumed.

Load bearing anchors:
n=2



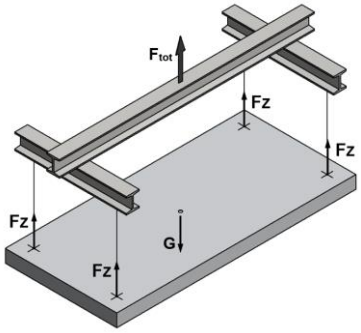
The compensated lifting slings ensure equal force distribution.

Load bearing anchors:
n=4

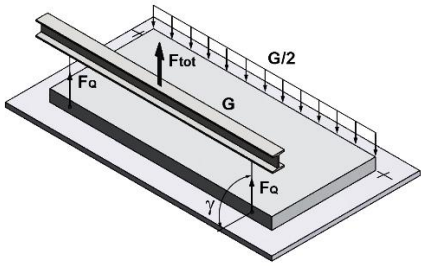


A perfect static weight distribution can be obtained using a lifting beam and two pairs of anchors set out symmetrically.

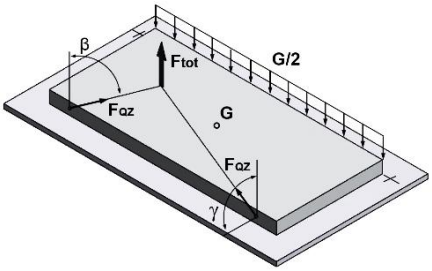
Load bearing anchors:
n=4



When the element is lifted without lifting table at a straight angle and the contact is kept with the ground. Additional shear reinforcement is required.



When the element is lifted without lifting table, angled and the contact is kept with the ground. Additional shear reinforcement is required. ***ß ≤ 30°***



ASYMETRIC DISTRIBUTION OF THE LOAD

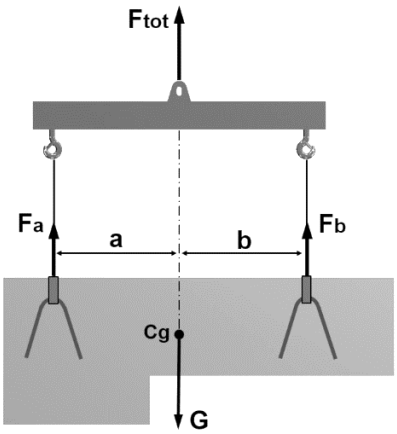
In case of asymmetrical elements before installing the anchors, calculate the loads based on the center of gravity position. The load of each anchor depends on the embedded position of the anchor in the precast unit and on the transporting mode:

a) If the arrangement of the anchors is asymmetrical in relation to the center of gravity, the individual anchor supports different loads. The load distribution in asymmetrical installed anchors when a spreader beam is used the forces on each anchor is calculated with the equation bellow:

$$F_a = F_{tot} \times \mathbf{b}/(\mathbf{a}+\mathbf{b})$$

$$F_b = F_{tot} \times \mathbf{a}/(\mathbf{a}+\mathbf{b})$$

Note: To avoid tilting of the element during transport, the load should be suspended from the lifting beam so that its center of gravity (Cg) is directly below the crane hook.



b) In the case of transporting without lifting beam, the load on the anchor depends on the cable angle (ß).

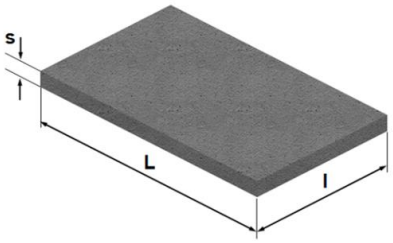
LOAD CAPACITY

The load capacity of the anchor depends on multiple factors such as:

- The deadweight of the precast concrete element "G"
- Adhesion to the formwork
- The load direction, angle of pull.
- Number of load bearing anchors
- The edge distance and spacing of the anchors
- The strength of the concrete at the time of operating: lifting or transporting
- The embedded depth of the anchor
- Dynamic forces
- The reinforcement arrangement

WEIGHT OF PRECAST UNIT

The total weight "G" of the precast reinforced concrete element is determined using a specific weight of: **ρ = 25kN/m³.** For prefabricated elements that are composed of a higher concentration of reinforcing elements in the calculation of weight will take this into account.



$$\mathbf{G} = \boldsymbol{\rho} \times \mathbf{V}$$

$$\mathbf{V} = \boldsymbol{L} \times \boldsymbol{l} \times \boldsymbol{s}$$

Where:
V - volume of precast unit in [m³]
L – length in [m]
l – width in [m]
s – thickness in [m]

ADHESION TO FORMWORK COEFFICIENT

When a precast element is lifted from the formwork, adhesion force between element and formwork appear. This force must be considered for the anchor load calculation and depends of the total area in contact with the formwork and the shape of the precast element and the material of the formwork. The value "H_a" of adhesion to the formwork is calculated through the following equation:

$$\boldsymbol{H_a} = \boldsymbol{q} \times \boldsymbol{A}\ [\boldsymbol{kN}]$$

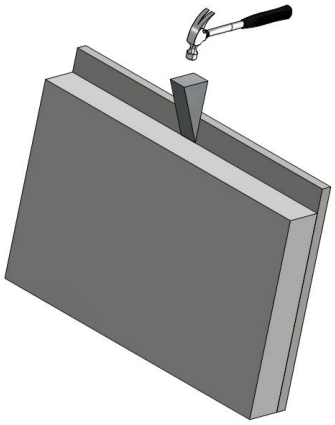
Where:
q- the adhesion to formwork factor according with the material of the formwork
A - the area of contact between the formwork and the concrete element when starting the lift

Adhesion to the formwork	
oiled steel formwork	$q \geq 1\ kN/m^2$
varnished timber formwork	$q \geq 2\ kN/m^2$
rough timber formwork oiled	$q \geq 3\ kN/m^2$

In some cases, like π - panel or other special shaped elements an increased adhesion coefficient must be considered.

Adhesion to the formwork	
Double T beams	$H_a = 2 \times G\ [kN]$
Ribbed elements	$H_a = 3 \times G\ [kN]$
Waffled panel	$H_a = 4 \times G\ [kN]$

Where:
G - dead weight of the element.



Adhesion to the formwork should be minimized before lifting the concrete element out of the formwork by removing as many parts of the formwork as possible.

Before lifting from the table, the adhesion to the formwork must be reduced as much as possible by removing the formwork from the concrete element (tilting the formwork table, short vibration for detachment, using wedges).

DYNAMIC LOADS COEFFICIENT

When the movement of the precast units is performed by lifting gear, dynamic forces which depend on the lifting gear used appear. The lifting classes are described in DIN 15018.

Lifting class	Lifting load coefficient "f" at lifting speed vh	
	Up to 90 m/min	Over 90 m/min
H 1	1.1 + 0.002 vh	1.3
H 2	1.2 + 0.004 vh	1.6
H 3	1.3 + 0.007 vh	1.9
H 4	1.4 + 0.009 vh	2.2

Lifting equipment	Dynamic coefficient "f"
Rail crane, swing-boom crane and fixed crane	1.3 *)
Lifting and transporting on level terrain	2.5
Lifting and transporting on uneven terrain	≥ 4.0
*) lower values may be appropriate in precast plants if special arrangements are made.	

For cranes with precision lifting, such as those in manufacturing plants the lifting load coefficient is $f = 1.1 \div 1.3$.

IN THE PRECAST YARD:
- for lifting out of the formwork $f = 1.1$
- for tilt-up and transport $f = 1.3$

ON SITE:

- for tilt-up/transport/install $f = 1.5$
- when transporting suspended precast elements over uneven terrain, the lifting load coefficient used is $f > 2$.

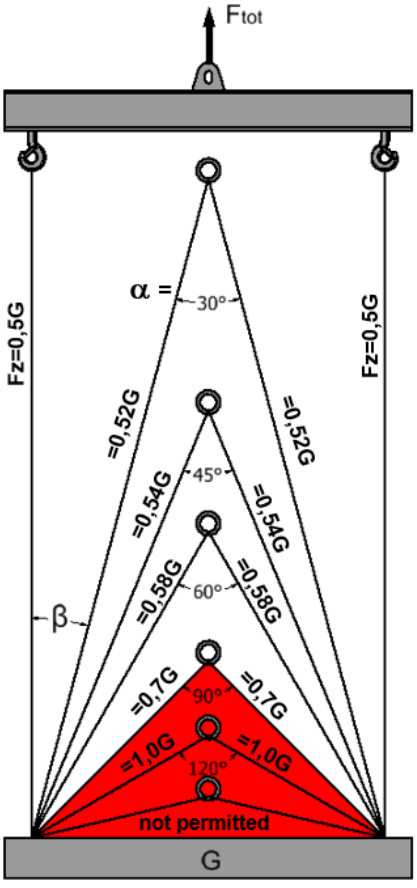
For special transport and lifting cases the dynamic coefficient is established based on the tests or on proven experience.

LIFTING AT AN ANGLE – CABLE ANGLE COEFFICIENT

The load value applied on each anchor depends on the chain inclination which is defined by the angle β between the normal direction and the lifting chain.
The cable angle β is determined by the length of the suspending chain. We recommend that, if possible, β should be kept to $\beta \leq 30^o$. The tensile force on the anchor will be increased with a cable angle coefficient "**z**".

$$\boldsymbol{F = F_{tot} \times z/n}$$

where:
z - cable angle coefficient
n - number of load bearing anchors



Cable angle β	Spread angle α	Cable angle factor z
0°	-	1.00
7.5°	15°	1.01
15.0°	30°	1.04
22.5°	45°	1.08
30.0°	60°	1.16
*37.5°	75°	1.26
*45.0°	90°	1.41

*** preferred ß ≤ 30°**

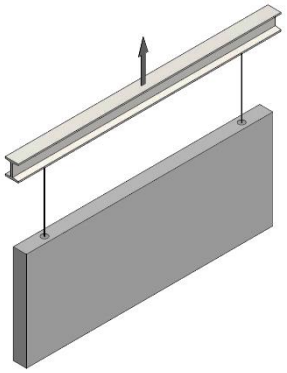
Note: If no lifting beam is used during transport, the anchor must be embedded symmetrically to the load.

Lifting symbols used in the documentation	
Axial pull in direction of anchor axis.	
Transverse pull perpendicular to the anchor axis.	
Angled pull, lifting at an angle to the anchor axis	

LOAD DIRECTIONS

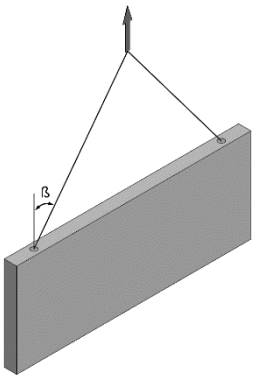
During the transportation and lifting various cases can occur, such tilt-up, rotation, hoisting and of course the installation. The lifting anchor and clutches most carry all this cases and combinations. Therefore, the load direction is a very important factor for a good anchor selection.

Axial load **ß = 0º to 10º**



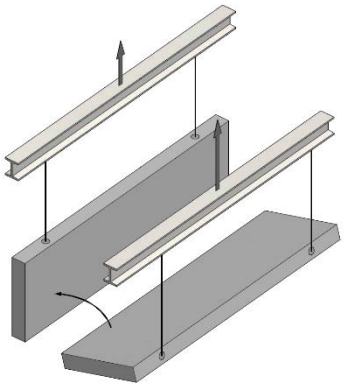
Diagonal load **ß = 10º to 45º**

Note: is recommended ***ß ≤ 30 º***

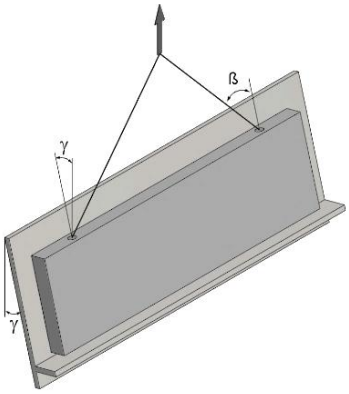


Tilting γ **= 90 º**

Additional shear reinforcement steel must be used.

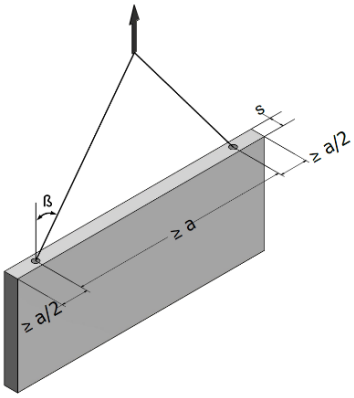


When a tilting table is used, the anchors can be used without the additional shear reinforcement steel, not exceeding the angle γ **< 15 º**

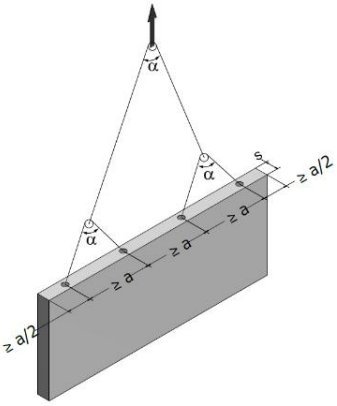


POSITIONING THE ANCHORS IN WALLS

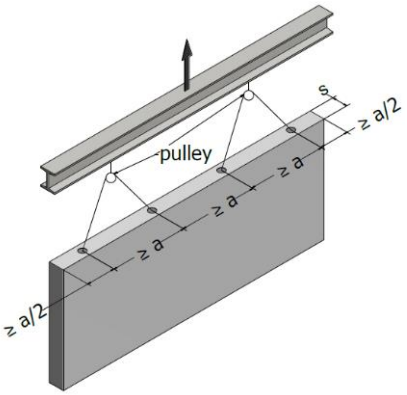
Load bearing anchors:
n=2

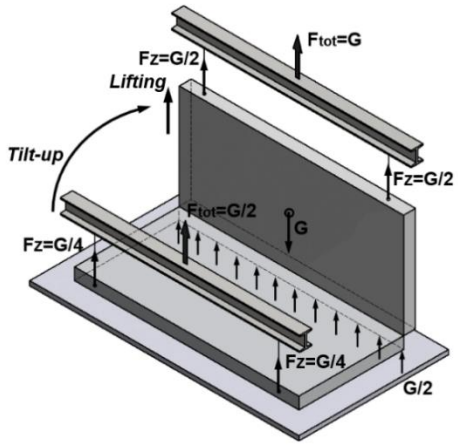


Load bearing anchors:
n=4



Load bearing anchors:
n=4





Lifting the walls from horizontal to vertical position without tilt-up table.

In this case, the anchors are loaded with a half of the element weight because a half of the element remains in contact with the casting table.

DETERMINATION OF ANCHOR LOAD

The load on each load bearing anchor is calculated with the following formula:

- **When de-mold** $\boldsymbol{F = (F_{tot} \times f \times z)/n = [(G + H_a) \times f \times z]/n}$

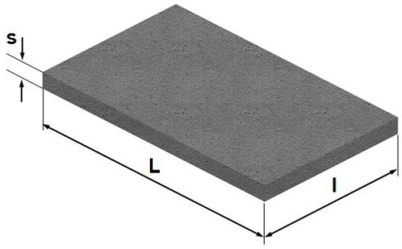
- **When tilting** $\boldsymbol{F = (F_{tot}/2 \times f \times z)/n = [(G/2 + H_a) \times f \times z]/n}$

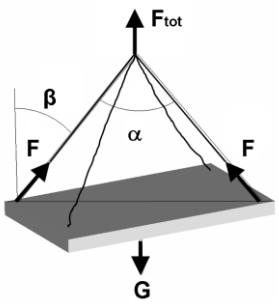
During tilting, the concrete element remains supported on the ground, only the half of the forces have to be taken into account.
In the situation of tilting, load carrying capacity of sockets and anchors is limited to 50% of the axial load.

- **When lifting** $\boldsymbol{F = (F_{tot} \times f \times z)/n = (G \times f \times z)/n}$

CALCULATION EXAMPLE

Example 1 SLAB UNIT





The slab unit has the following dimensions: $\boldsymbol{L = 5\ m, l = 2\ m, s = 0.2\ m}$
Weight $\boldsymbol{G = \rho \times V = 25 \times (5 \times 2 \times 0.2) = 50\ kN}$
Formwork area $\boldsymbol{A = L \times l = 5 \times 2 = 10\ m^2}$
Anchor number $\boldsymbol{n = 2}$

General dates:	**Symbol**	**De-mould**	**Transport**	**Mount**
Concrete strength at de-mold [MPa]		15	15	
Concrete strength on site [MPa]				35
Weight for element [kN]	**G**	50		
Element area in contact with formwork [m²]	**A**	10		
Cable angle factor at de-mold (β = 15.0°)	**z**	1.04	1.04	
Cable angle factor on site (β = 30.0°)	**z**			1.16
Dynamic coefficient at de-mold	**f**	1.1		
Dynamic coefficient at transport	**f**		1.3	
Dynamic coefficient on site	**f**			1.5
Adhesion to formwork factor for varnished timber formwork [kN/m²]	**q**	2		
Anchor number for de-mold	**n**	2		
Anchor number for transport at the plant	**n**		2	
Anchor number for transport on site	**n**			2

DE-MOULD AT THE PLANT:

Adhesion to formwork factor:	q = 2 kN/m^2
Lifting load coefficient:	f = 1.1
Cable angle factor:	z = 1.04 (β = 15.0°)
Concrete strength:	15 MPa

$$F = \frac{[(G + q \times A) \times f \times z]}{n} = \frac{[(50 + 2 \times 10) \times 1.1 \times 1.04]}{2} = 40.04\ kN$$

TRANSPORT AT THE PLANT:

Dynamic coefficient:	f = 1.3
Cable angle factor:	z = 1.04 (β = 15.0°)
Concrete strength:	15 MPa

$$F = \frac{G \times f \times z}{n} = \frac{50 \times 1.3 \times 1.04}{2} = 33.80\ kN$$

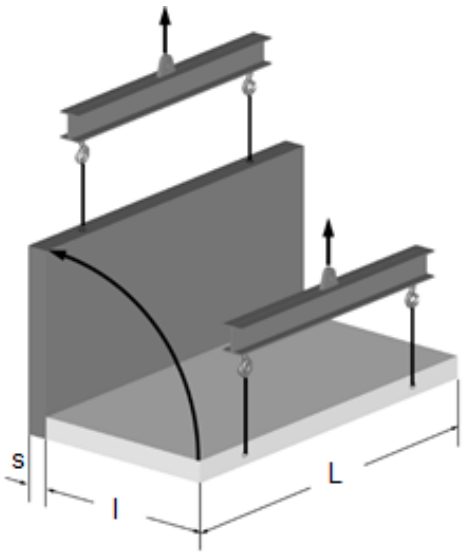
TRANSPORT AT SITE:

Dynamic coefficient:	f = 1.5
Cable angle factor:	z = 1.16 (β = 30.0°)
Concrete strength:	35 MPa

$$F = \frac{G \times f \times z}{n} = \frac{50 \times 1.5 \times 1.16}{2} = 43.50\ kN$$

An anchor in the **50 kN** range is required.

Example 2 WALL PANEL



The slab unit has the following dimensions: $L = 7.5\ m, l = 2\ m, s = 0.18\ m$
Weight $G = \rho \times V = 25 \times (7.5 \times 2 \times 0.18) = 67.5\ kN$
Formwork area $A = L \times l = 7.5 \times 2 = 15\ m^2$
Anchor number $n = 2$

General dates:	Symbol	De-mould	Tilting	Mount
Concrete strength at de-mold [MPa]		15	15	
Concrete strength on site [MPa]				45
Weight for element [kN]	**G**	67.5		
Element area in contact with formwork [m²]	**A**	15		
Cable angle factor at de-mold (β = 0,0°)	**z**	1.0		

Cable angle factor at tilting (β = 0.0°)	**z**		1.0	
Cable angle factor on site (β = 30°)	**z**			1.16
Dynamic coefficient at de-mold	**f**	1.1		
Dynamic coefficient at tilting	**f**		1.3	
Dynamic coefficient on site	**f**			1.3
Adhesion factor for oiled steel formwork [kN/m²]	**q**	1.0		
Anchor number for de-mold	**n**	4		
Anchor number at tilting	**n**		2	
Anchor number for transport on site	**n**			2

DE-MOULD / TILT-UP AT THE PLANT:

Adhesion to formwork factor: q = 1 kN/m^2
Lifting load coefficient: f = 1.1
Cable angle factor: z = 1.04 (β = 15.0°)
Concrete strength: 15 MPa

$$F = \frac{[(G/2 + q \times A) \times f \times z]}{n} = \frac{[(67.5/2 + 1 \times 15) \times 1.1 \times 1]}{2} = 26.81\ kN$$

TRANSPORT AT THE PLANT:

Dynamic coefficient: f = 1.3
Cable angle factor: z = 1 (β = 0°)
Concrete strength: 15 MPa

$$F = \frac{G \times f \times z}{n} = \frac{67.5 \times 1.3 \times 1}{2} = 43.87\ kN$$

TRANSPORT ON SITE:

Dynamic coefficient: f = 1.3
Cable angle factor: z = 1.16 (β = 30.0°)
Concrete strength: 35 MPa

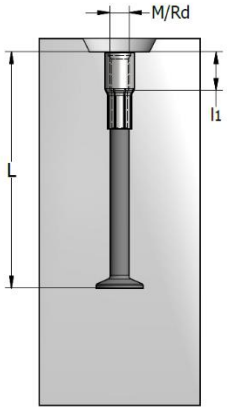
$$F = \frac{G \times f \times z}{n} = \frac{67.5 \times 1.3 \times 1.16}{2} = 50.89\ kN$$

Two anchors embedded on lateral side, in the 63kN range are required.
Usually for this type of anchor reinforcement tail and tilting reinforcement are added.
It is advisable to de-formwork before tilting.

HD – LIFTING ANCHORS

LIFTING SOCKET – ANCHOR – HBS

Terwa HBS anchors are designed for lifting and transporting various precast concrete elements with a load range between 1.3 and 15 tones. The anchor consists in a steel slot who assure the emending in the concrete and a threaded socket pressed at the top. The lifting anchors are available with a metric thread and round thread.



The HBS – anchors are manufactured in three variants:

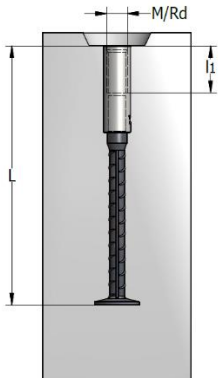
- Socket - steel S355JO zinc plated, foot - steel S355J2
- Socket - stainless steel– W 1.4571 [SS4], foot - steel S355J2

HBS	Zinc galvanizing Product no.	Stainless steel SS4 Product no.	Load group f_{cu} > 15 MPa	Thread	Overall length L	l_1	Weight
			[t]	Rd	[mm]	[mm]	[kg/pc]
HBS-Rd12-70	47337	47338	1.3	12	70	22	0.084
HBS-Rd12-130	43562	45719	1.3	12	130	22	0.120
HBS-Rd16-90	46637	47340	2.5	16	90	30	0.196
HBS-Rd16-100	49745	49746	2.5	16	100	30	0.208
HBS-Rd16-140	47432	47433	2.5	16	140	30	0.256
HBS-Rd16-175	43563	45721	2.5	16	175	30	0.300
HBS-Rd16-200	43564	45722	2.5	16	200	30	0.330
HBS-Rd20-125	46638	47339	4.0	20	125	35	0.404
HBS-Rd20-135	49748	49749	4.0	20	135	35	0.425
HBS-Rd20-175	60172	60562	4.0	20	175	35	0.505
HBS-Rd20-258	43565	45725	4.0	20	258	35	0.670
HBS-Rd24-140	46639	47342	5.0	24	140	41	0.586
HBS-Rd24-155	49751	49752	5.0	24	155	41	0.624
HBS-Rd24-275	43567	45727	5.0	24	275	41	0.920
HBS-Rd24-325	43568	45728	5.0	24	325	41	1.043
HBS-Rd30-185	46640	47466	7.5	30	185	55	1.053
HBS-Rd30-215	49754	49755	7.5	30	215	55	1.160
HBS-Rd30-325	43569	45729	7.5	30	325	55	1.551
HBS-Rd30-400	43570	45730	7.5	30	400	55	1.816
HBS-Rd36-285	49757	49758	10.0	36	285	65	2.136
HBS-Rd36-375	43650	45731	10.0	36	375	65	2.590
HBS-Rd36-475	43651	45732	10.0	36	475	65	3.071
HBS-Rd42-425	43652	45733	12.5	42	425	70	4.114
HBS-Rd42-550	43653	45734	12.5	42	550	70	5.000
HBS-Rd52-575	43654	45735	15.0	52	575	100	7.080

The loads indicated in the upper table are available for axial pull. For angled lift β > 30° it is essential to consider a reduced load. For turning the anchor capacity is about 50% of admissible load at axial pull.

HBS-M	Zinc galvanizing Product no.	Stainless steel SS4 Product no.	Load group f_{cu} > 15 MPa	Thread	Overall length L	l_1	Weight
			[t]	MRd	[mm]	[mm]	[kg/pc]
HBS-M12-70	61046	61047	1.3	12	70	22	0.084
HBS-M12-130	61043	61044	1.3	12	130	22	0.120
HBS-M16-90	61049	61050	2.5	16	90	30	0.196
HBS-M16-100	61052	61053	2.5	16	100	30	0.208
HBS-M16-140	61055	61056	2.5	16	140	30	0.256
HBS-M16-175	61058	61059	2.5	16	175	30	0.300
HBS-M16-200	61060	61061	2.5	16	200	30	0.330
HBS-M20-125	61070	61071	4.0	20	125	35	0.404
HBS-M20-135	61073	61074	4.0	20	135	35	0.425
HBS-M20-175	61076	63133	4.0	20	175	35	0.505
HBS-M20-258	61067	61068	4.0	20	258	35	0.670
HBS-M24-140	61077	61078	5.0	24	140	41	0.586
HBS-M24-155	61080	61081	5.0	24	155	41	0.624
HBS-M24-275	61083	61084	5.0	24	275	41	0.920
HBS-M24-325	61085	61086	5.0	24	325	41	1.043
HBS-M30-185	61088	61089	7.5	30	185	55	1.053
HBS-M30-215	61091	61092	7.5	30	215	55	1.160
HBS-M30-325	61094	61095	7.5	30	325	55	1.551
HBS-M30-400	61096	61097	7.5	30	400	55	1.816
HBS-M36-285	61099	61100	10.0	36	285	65	2.136
HBS-M36-375	61102	61103	10.0	36	375	65	2.590
HBS-M36-475	61104	61105	10.0	36	475	65	3.071
HBS-M42-425	61107	61108	12.5	42	425	70	4.114
HBS-M42-550	61109	61110	12.5	42	550	70	5.000
HBS-M52-575	61112	61196	15.0	52	575	100	7.080

LIFTING SOCKET – ANCHOR – HBS with Barrier



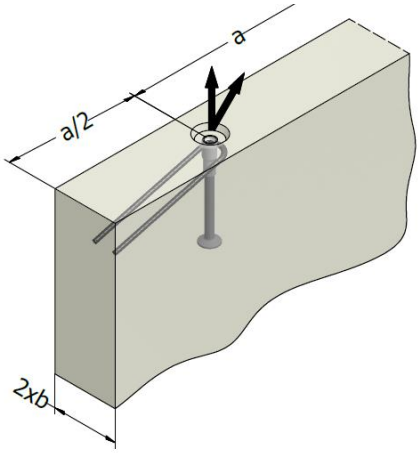
The HBS with barrier consists in a Terwa bush made from stainless steel (SS) and a HBS foot made from reinforcement steel. The bush is machined in both sides, thus achieving a barrier in the middle, preventing the infiltration of water or other corrosive factors.

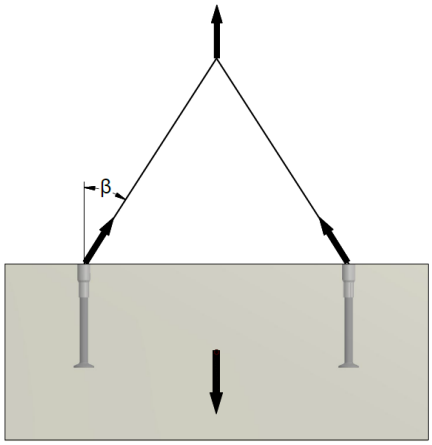
HBS – With Barrier	Product no.	Load group	Thread	Overall length	l_1	Weight
		f_{cu} > 15 MPa		L		
		[t]	MRd	[mm]	[mm]	[kg/pc]
HBS-with barrier Rd16-200	60450	2.5	16	200	30	0.330
HBS-with barrier Rd24-325	60451	5.0	24	325	46	1.043
HBS-with barrier Rd30-400	60452	7.5	30	400	56	1.816

The loads indicated in the upper table are available for axial pull. For angled lift β > 30° it is essential to consider a reduced load. For turning/tilting the anchor capacity is about 50% of admissible load at axial pull.

LIFTING AND TRANSPORT – HBS LONG ANCHORS

Edge distance and spacing for lifting sockets.

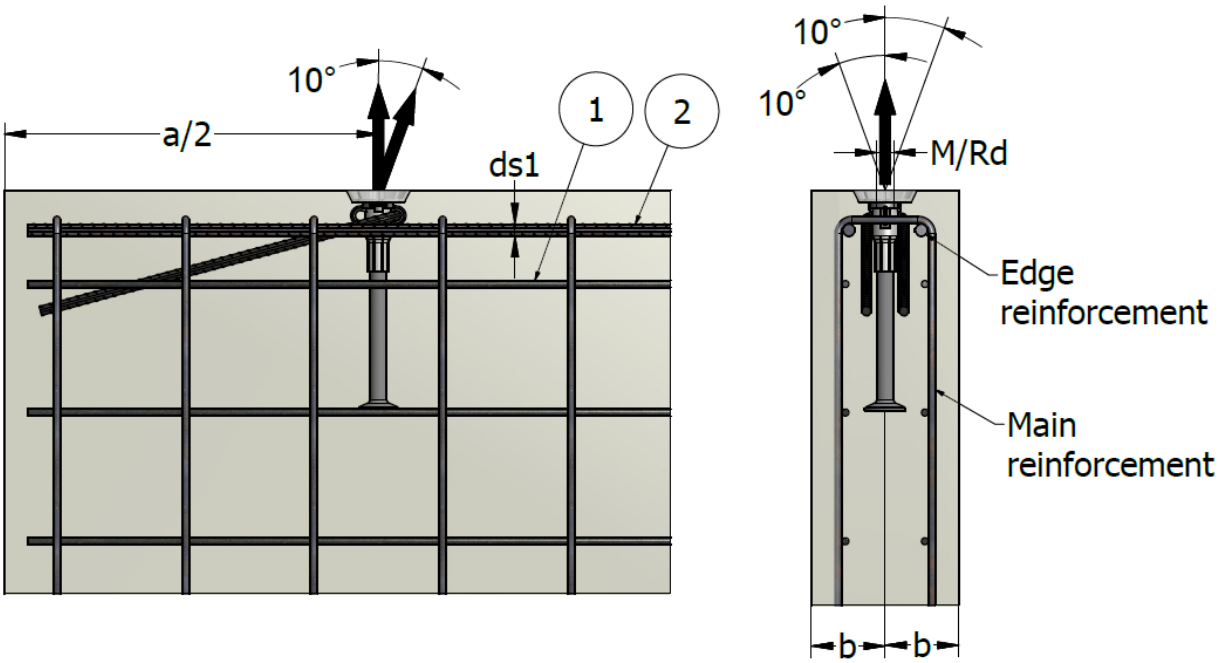




HBS-SS2/SS4	Load group f_{cu} > 15 MPa	Thread	a min	minimum element thickness 2 x b	Axial load and diagonal load ≤30°			Axial load and diagonal load ≤ 45°			Transversal load		
					15 MPa	25 MPa	35 MPa	15 MPa	25 MPa	35 MPa	15 MPa	25 MPa	35 MPa
	[t]	M(Rd)	[mm]	[mm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]
HBS-M(Rd)12-130	1.3	12	440	80	13.0	13.0	13.0	10.4	13.0	13.0	5.9	7.5	7.5
				100	13.0	13.0	13.0	10.5	13.0	13.0	7.5	7.5	7.5
				120	13.0	13.0	13.0	10.5	13.0	13.0	7.5	7.5	7.5
HBS-M(Rd)16-140	2.5	16	450	100	13.5	17.4	20.6	10.8	17.4	20.6	6.8	8.8	10.4
				120	15.5	20.0	23.7	12.4	20.0	23.7	9.9	12.7	14.0
				140	17.4	22.4	25.0	13.9	22.4	25.0	11.6	14.0	14.0
HBS-M(Rd)16-200	2.5	16	640	80	18.7	24.1	25.0	15.0	24.1	25.0	4.2	5.4	6.4
				100	22.7	25.0	25.0	18.2	25.0	25.0	6.8	8.8	10.4
				120	25.0	25.0	25.0	18.9	25.0	25.0	9.9	12.7	14.0
HBS-M(Rd)20-258	4.0	20	800	120	33.1	40.0	40.0	29.8	40.0	40.0	8.9	11.5	13.6
				140	36.0	40.0	40.0	31.8	40.0	40.0	12.9	16.6	19.6
				160	39.0	40.0	40.0	31.8	40.0	40.0	17.5	22.6	23.0
HBS-M(Rd)24-325	5.0	24	1000	120	40.0	50.0	50.0	40.0	50.0	50.0	13.1	16.9	20.0
				140	45.6	50.0	50.0	42.1	50.0	50.0	14.7	19.0	22.5
				160	49.0	50.0	50.0	42.1	50.0	50.0	20.0	25.8	28.0
HBS-M(Rd)30-400	7.5	30	1240	160	66.8	75.0	75.0	66.8	75.0	75.0	24.2	31.2	36.9
				180	71.8	75.0	75.0	67.7	75.0	75.0	31.1	40.1	42.5
				200	75.0	75.0	75.0	67.7	75.0	75.0	39.1	42.5	42.5
HBS-M(Rd)36-475	10.0	36	1460	180	90.7	100.0	100.0	90.7	100.0	100.0	30.5	39.4	46.6
				200	98.3	100.0	100.0	92.6	100.0	100.0	38.1	49.1	57.0
				220	100.0	100.0	100.0	92.6	100.0	100.0	46.2	57.0	57.0
HBS-M(Rd)42-550	12.5	42	1700	200	125.0	125.0	125.0	120.2	125.0	125.0	40.1	51.7	61.1
				220	125.0	125.0	125.0	120.2	125.0	125.0	48.4	62.4	71.0
				240	125.0	125.0	125.0	120.2	125.0	125.0	57.9	71.0	71.0
HBS-M(Rd)52-575	15.0	52	1760	200	126.8	150.0	150.0	126.8	150.0	150.0	36.2	46.7	55.2
				220	139.5	150.0	150.0	139.5	150.0	150.0	44.3	57.2	66.7
				240	150.0	150.0	150.0	144.8	150.0	150.0	53.0	68.5	81.0
				280	150.0	150.0	150.0	144.8	150.0	150.0	72.5	85.5	85.5

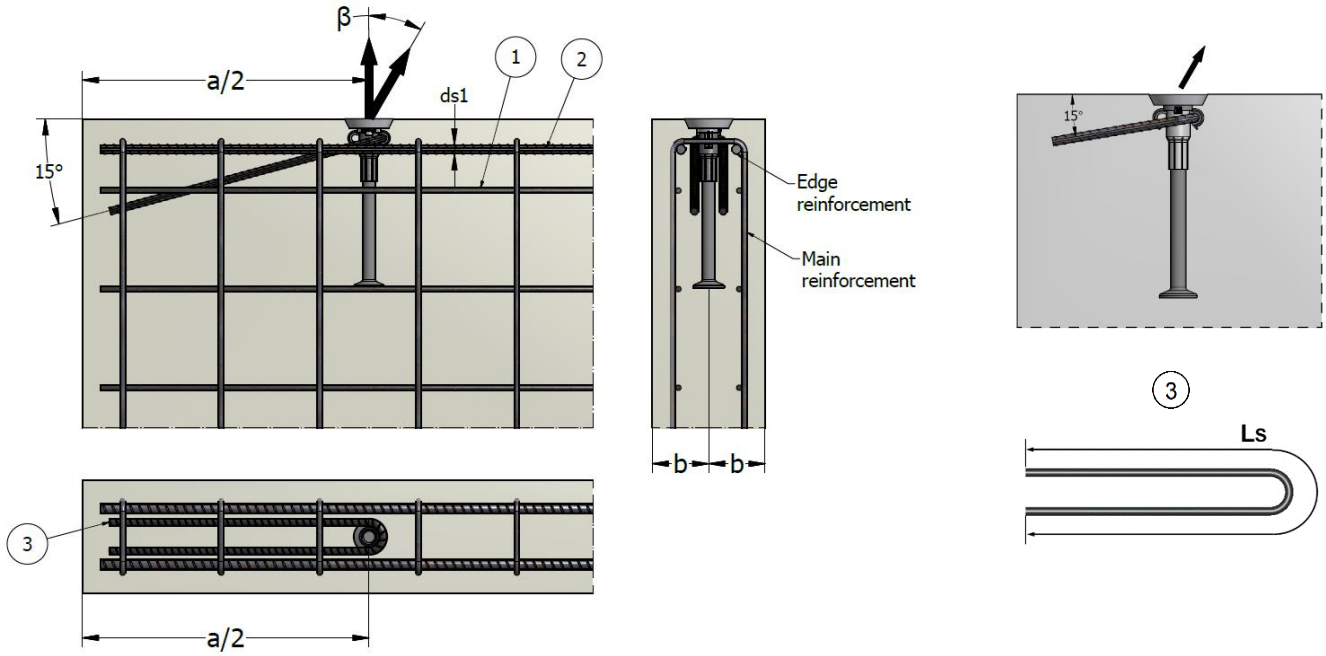
The dimensions indicated in the upper table are available when cage or two layers of mesh are used.

REINFORCEMENT AND LOAD CAPACITY – AXIAL LOAD UP TO 10°

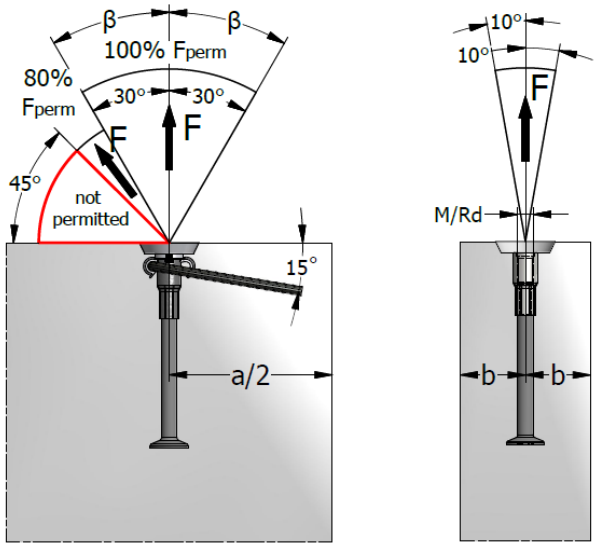


HBS-M(Rd)	Load group	Minim unit thickness	Axial spacing	Mesh reinforcement (1)	Edge reinforcement (2)	Load capacity	
		2 x b	a		d_{s1}	f_{cu} > 15N/mm²	f_{cu} > 25N/mm²
	[t]	[mm]	[mm]	[mm²/m]	[mm]	[kN]	[kN]
M(Rd)12-130	1.3	80/100/120	440	2 x 188	-	13	13
M(Rd)16-140	2.5	100/120/140	450	2 x 188	-	25	25
M(Rd)16-200	2.5	80/100/120	640	2 x 188	-	25	25
M(Rd)20-258	4.0	120/140/160	800	2 x 188	-	40	40
M(Rd)24-325	5.0	120/140/160	1000	2 x 188	-	50	50
M(Rd)30-400	7.5	160/180/200	1240	2 x 188	2 x Ø12	75	75
M(Rd)36-475	10.0	180/200/220	1460	2 x 188	2 x Ø14	100	100
M(Rd)42-550	12.5	200/220/240	1700	2 x 188	2 x Ø14	125	125
M(Rd)52-575	15.0	200/220/240/280	1760	2 x 188	2 x Ø14	150	150

REINFORCEMENT AND LOAD CAPACITY – DIAGONAL LOAD UP TO 45°



HBS-M(Rd)	Load group	Minim unit thickness	Axial spacing	Mesh reinforcement (1)	Edge reinforcement (2)	Diagonal reinforcement β ≤ 30° (3)		Diagonal reinforcement β ≤ 45° (3)		Load capacity
		2 x b	a		d_{s1}	d_s	L_s	d_s	L_s	f_{cu} > 15N/mm²
	[t]	[mm]	[mm]	[mm²/m]	[mm]	[mm]	[mm]	[mm]	[mm]	[kN]
M(Rd)12-130	1.3	80/100/120	440	2 x 188	-	Ø8	850	Ø8	1000	13
M(Rd)16-140	2.5	100/120/140	450	2 x 188	-	Ø10	1200	Ø10	1400	25
M(Rd)16-200	2.5	80/100/120	640	2 x 188	-	Ø8	1000	Ø10	1200	25
M(Rd)20-258	4.0	120/140/160	800	2 x 188	-	Ø10	1200	Ø12	1750	40
M(Rd)24-325	5.0	120/140/160	1000	2 x 188	-	Ø12	1750	Ø14	2000	50
M(Rd)30-400	7.5	160/180/200	1240	2 x 188	2 x Ø12	Ø14	1750	Ø16	2000	75
M(Rd)36-475	10.0	180/200/220	1460	2 x 188	2 x Ø14	Ø16	2000	Ø20	2050	100
M(Rd)42-550	12.5	200/220/240	1700	2 x 188	2 x Ø14	Ø20	2050	Ø20	2200	125
M(Rd)52-575	15.0	200/220/240/280	1760	2 x 188	2 x Ø14	Ø20	2200	Ø25	2200	150

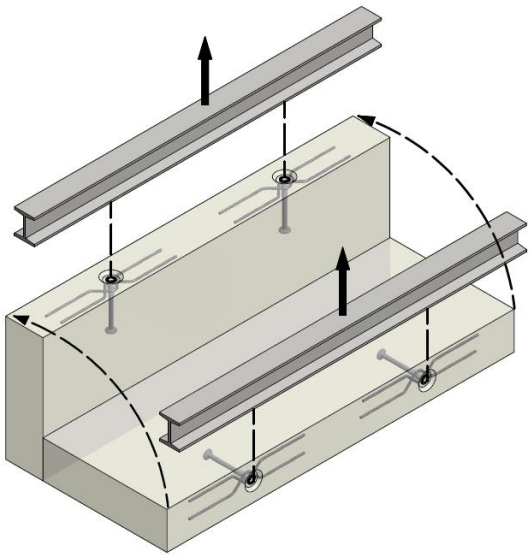


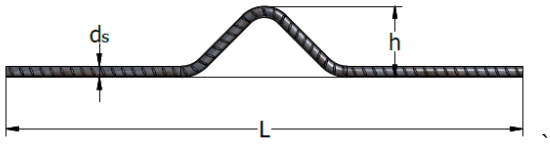
Note: *The bending radius will be established considering the EN 1992.*

The diagonal reinforcement must be placed with direct contact to the socket anchor.
Always install diagonal reinforcement opposite the load direction.
The dimensions in pictures are in [mm].

REINFORCEMENT AND LOAD CAPACITY – DIAGONAL LOAD AND TILTING UP TO 90°

For tilting and diagonal pull, additional reinforcements must be installed in the anchor zone. Take care for the anchors placement so that they ensure the load transfer. When turning and lifting at an angle, tilt reinforcement is sufficient and no need of reinforcement for angle lift.





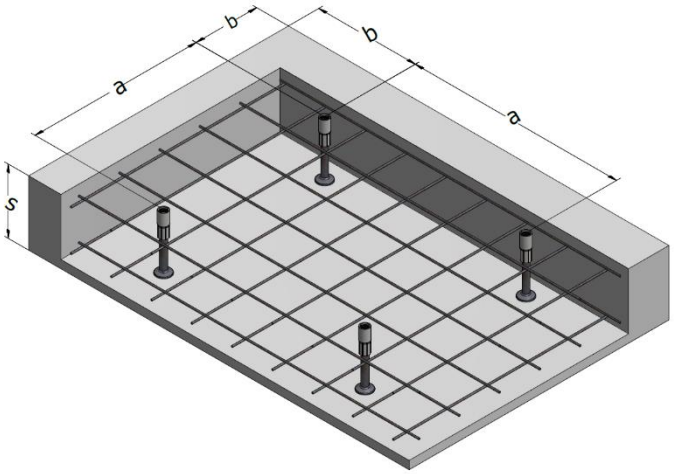
Tilt reinforcement

HBS-SS2/SS4	Load group f_{cu} > 15 MPa	Thread	Overall length	Element thickness	Transversal reinforcement		
					Dia. ds	High h	Length before bending
	[t]	M(Rd)	[mm]	[mm]	[mm]	[mm]	[mm]
HBS-M(Rd)12-130	1.3	12	130	80	Ø8	33	550
				100	Ø8	43	550
				120	Ø8	53	550
HBS- M(Rd)16-140	2.5	16	140	100	Ø 12	47	750
				120	Ø 12	57	750
				140	Ø 12	67	750
HBS- M(Rd)16-200	2.5	16	200	80	Ø 12	37	750
				100	Ø 12	47	750
				120	Ø 12	57	750
HBS- M(Rd)20-258	4.0	20	258	120	Ø 16	62	900
				140	Ø 16	72	900
				160	Ø 16	82	900
HBS- M(Rd)24-325	5.0	24	325	120	Ø 16	66	1100
				140	Ø 16	76	1100
				160	Ø 16	86	1100
HBS- M(Rd)30-400	7.5	30	400	160	Ø 20	94	1300
				180	Ø 20	104	1300
				200	Ø 20	114	1300
HBS- M(Rd)36-475	10.0	36	475	180	Ø 20	108	1700
				200	Ø 20	118	1700
				220	Ø 20	128	1700
HBS- M(Rd)42-550	12.5	42	550	200	Ø 25	127	1650
				220	Ø 25	137	1650
				240	Ø 25	147	1650
HBS- M(Rd)52-575	15.0	52	575	200	Ø 25	133	1950
				220	Ø 25	143	1950
				240	Ø 25	153	1950
				280	Ø 25	173	1950

LIFTING AND TRANSPORT – HBS SHORT ANCHORS

Edge distance and spacing for lifting sockets.

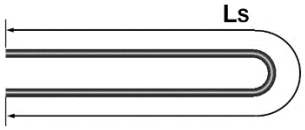
HBS-M(Rd)	s minimum	a minimum	a_1 minimum
	[mm]	[mm]	[mm]
M(Rd)12-70	120	220	140
M(Rd)16-90	160	280	180
M(Rd)20-125	220	400	250
M(Rd)24-140	280	450	300
M(Rd)30-185	360	560	370



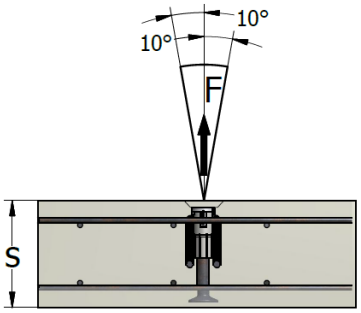
The HBS short anchors are used for lifting flat elements such as floor slabs. The lifting angle must be ≤45°. For a lifting angle between 10° and 45°, it is required an additional reinforcement.

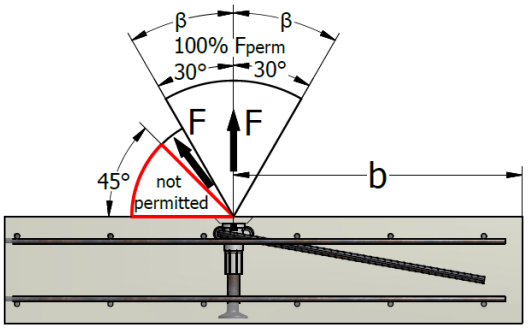
HBS-M(Rd)	Load group	Thread	Overall length	Element thickness	Axial load and diagonal load ≤ 45°		
	f_{cu} > 15 MPa				15 MPa	25 MPa	35 MPa
	[t]	M(Rd)	[mm]	[mm]	[kN]	[kN]	[kN]
HBS-M(Rd)12-70	1.3	12	70	120	13.0	13.0	13.0
HBS-M(Rd)16-90	2.5	16	90	130	16.5	21.3	25.0
				160	19.5	25.0	25.0
HBS-M(Rd)20-125	4.0	20	125	160	25.3	32.6	38.6
				220	31.2	40.0	40.0
HBS-M(Rd)24-140	5.0	24	140	180	29.1	37.5	44.4
				280	39.3	50.0	50.0
HBS-M(Rd)30-185	7.5	30	185	240	44.9	57.9	68.5
				360	59.4	75.0	75.0

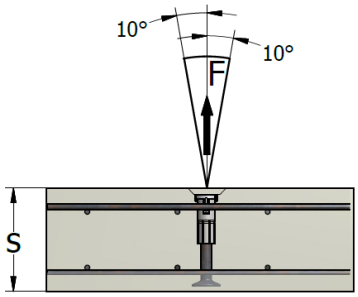
HBS-M(Rd) short	Thread	Two layers of mesh	Diagonal reinforcement			
			Diameter d	Length before bending		
				15 MPa	25 MPa	35 MPa
	MRd	mm²/m	[mm]	[mm]	[mm]	[mm]
HBS –M(Rd)12-70	12	2 x 188	Ø10	800	700	600
HBS –M(Rd)16-90	16	2 x 188	Ø 12	900	850	750
HBS –M(Rd)20-125	20	2 x 188	Ø 14	1020	850	750
HBS –M(Rd)24-140	24	2 x 188	Ø 14	1650	1400	1200
HBS –M(Rd)30-185	30	2 x 188	Ø 16	2000	1600	1400

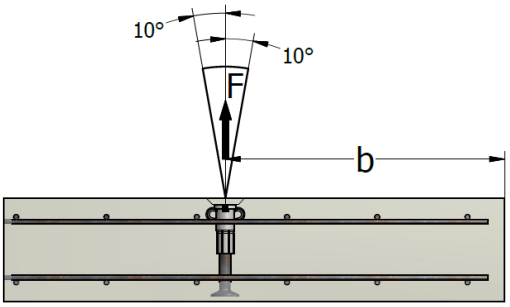


Note: *The bending radius will be established considering the EN 1992.*
The mesh reinforcement must be in two layers.
The diagonal reinforcement must be placed with direct contact to the socket anchor.
Always install diagonal reinforcement opposite the load direction.







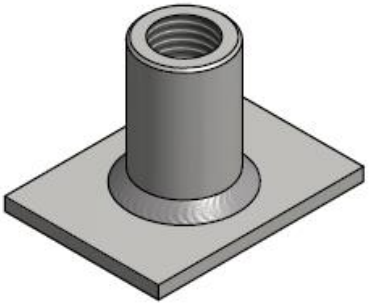


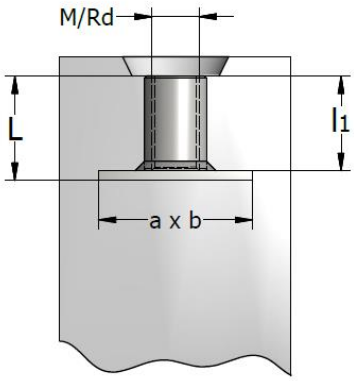
Note: *The bending radius will be established considering the EN 1992.*

The diagonal reinforcement must be placed with direct contact to the socket anchor. Always install diagonal reinforcement opposite the load direction.
The dimensions in pictures are in [mm].

LIFTING SOCKET WITH FOOT PLATE – HSP-HD

The Lifting Socket with Foot Plate is low profile suitable for the face of thin panels or top slabs which are lifted perpendicular to their largest surfaces. The foot plate and the socket are fully welded, so the insert is effectively sealed. The threaded bush is made of steel S355JO, and the plate is manufactured from steel sheet. The anchors are available in zinc plated version or made of stainless steel SS4 (W 1.4571).
The preferred lift angle is an angle **ß ≤ 30°.**
Safe working loads shown are after the application of a safety factor on test loads of 2 for 15MPa concrete and 3 for steel.

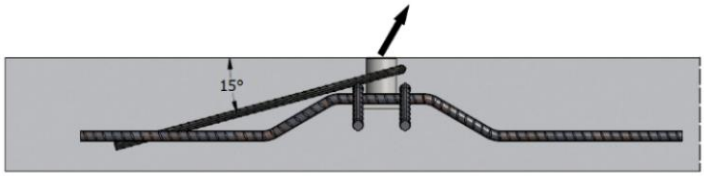


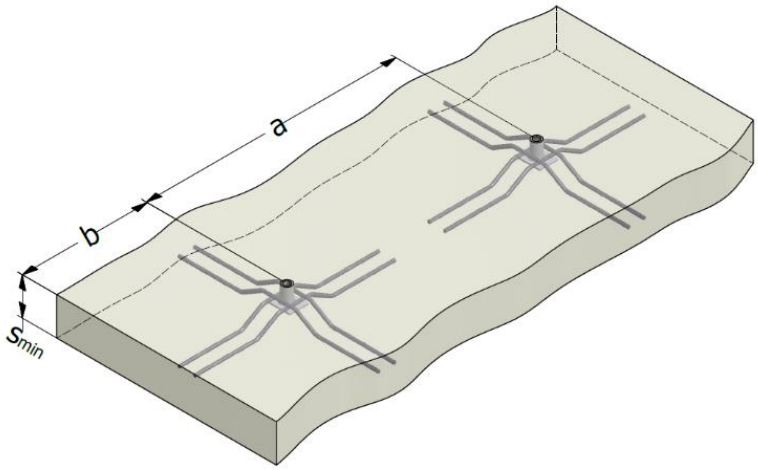


HSP-HD M	Product no.	Thread	Load group f_{cu} > 15 MPa	Overall length L	a	b
	Zinc galvanizing	M	[t]	[mm]	[mm]	[mm]
HSP-HD M12	61608	12	1.3	46	50	50
HSP-HD M16	61609	16	2.5	54	60	80
HSP-HD M20	61610	20	4.0	72	80	100
HSP-HD M24	61611	24	5.0	83	100	130
HSP-HD M30	61612	30	7.5	98	130	130

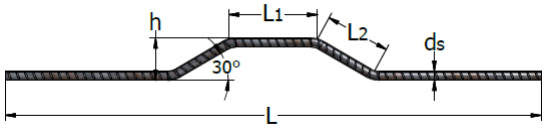
HSP-HD Rd	Product no.	Thread	Load group f_{cu} > 15 MPa	Overall length L	a	b
	Zinc galvanizing	Rd	[t]	[mm]	[mm]	[mm]
HSP-HD Rd12	61666	12	1.3	46	50	50
HSP-HD Rd16	61667	16	2.5	54	60	80
HSP-HD Rd20	61668	20	4.0	72	80	100
HSP-HD Rd24	61669	24	5.0	83	100	130
HSP-HD Rd30	61670	30	7.5	98	130	130

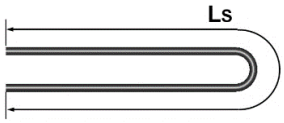
LIFTING SOCKETS HSP – INSTALLATION AND REINFORCEMENTS





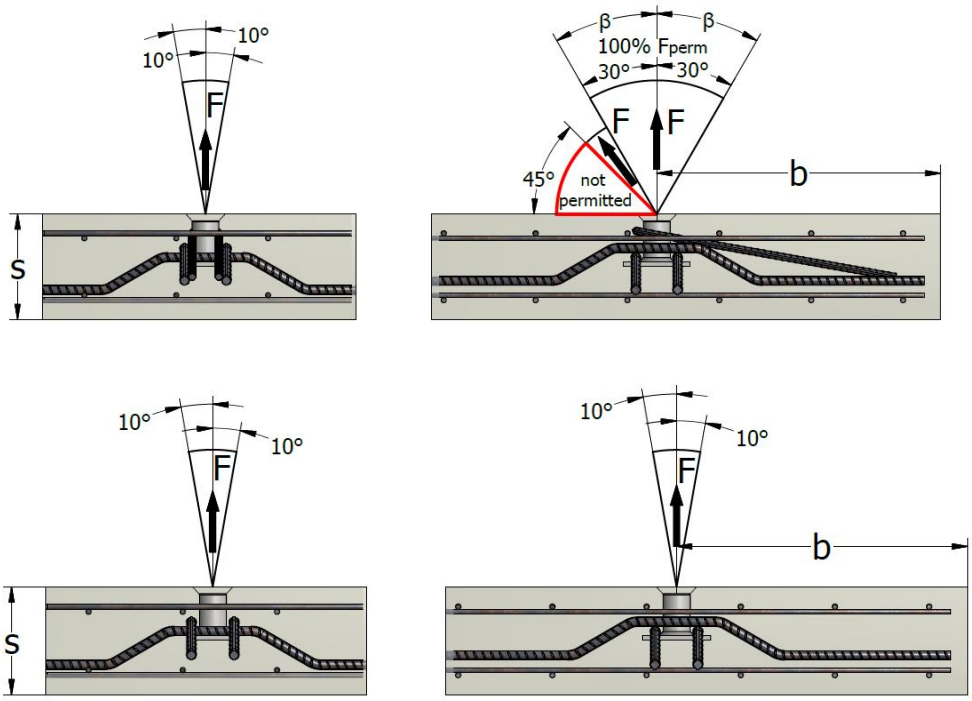
HSP M(Rd)	Load group	Minim unit thickness	Anchor spacing	Edge distance	Mesh reinforcement
		Smin	a	b	
	[t]	[mm]	[mm]	[mm]	[mm²/m]
12	1.3	100	500	250	188
16	2.5	120	820	410	188
20	4.0	150	1020	510	188
24	5.0	160	1300	650	188
30	7.5	200	1300	650	260





Note: *The bending radius will be established considering the EN 1992.*
The additional reinforcement must be placed and secured on top of the plate anchor and in direct contact with the plate.
The mesh reinforcement must be in two layers.
The additional reinforcement must be placed cross-wise in pairs.

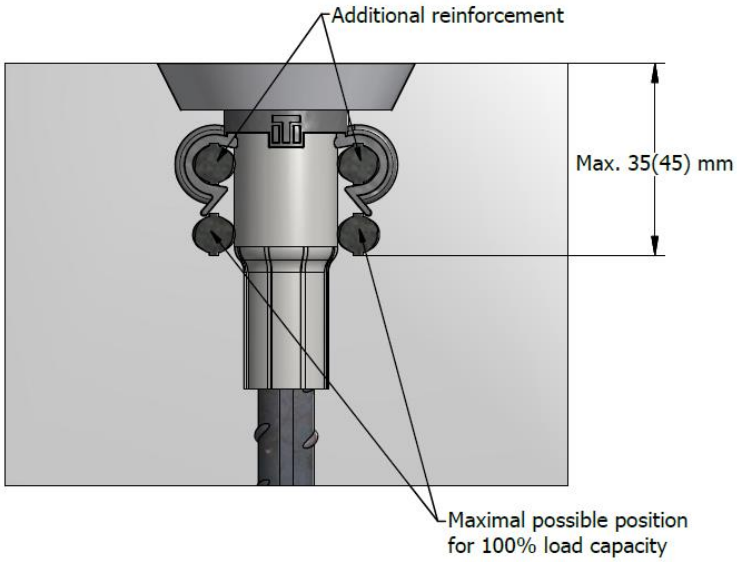
HSP M(Rd)	Additional reinforcement						Axial load ß ≤10°	Diagonal load 10°≤ ß≤45°	
	number	d_s	L_1	L_2	h	L	Load capacity f_{cu} > 15MPa	Load capacity f_{cu} > 15MPa	Angled pull reinforcement Ø x l_s
	[pcs]	[mm]	[mm]	[mm]	[mm]	[mm]	[kN]	[kN]	[mm]
12	4	8	60	80	40	400	13	10.4	Ø 10 x 750
16	4	10	90	110	55	620	25	20.0	Ø 12 x 1300
20	4	12	110	110	55	800	40	32.0	Ø 12 x 1400
24	4	16	140	120	60	1120	50	40.0	Ø 16 x 1500
30	4	16	140	120	60	1220	75	60.0	Ø 16 x 1750



Note: *The bending radius will be established considering the EN 1992.*

The diagonal reinforcement must be placed with direct contact to the socket anchor. Always install diagonal reinforcement opposite the load direction.
The dimensions in pictures are in [mm].

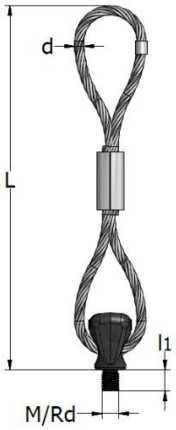
INSTALLATION TOLERANCES FOR LIFTING SOCKET ANCHOR



LIFTING SYSTEMS

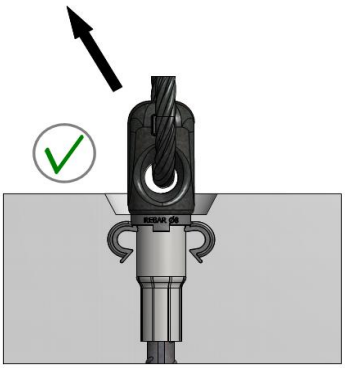
LIFTING SLING - THS1

The Lifting Slings can be used with all types of anchors and threaded sockets. Suitable for most lifting situations, particularly site operations. They can be reused, but only after inspection. If they are kept in stores for reuse they must be inspected every six months and retested every year. These lifting systems are not recommended for severe reuse conditions.
Threaded Lifting Sling should only be attached to the concrete unit and used after the concrete strength has reached 15MPa.

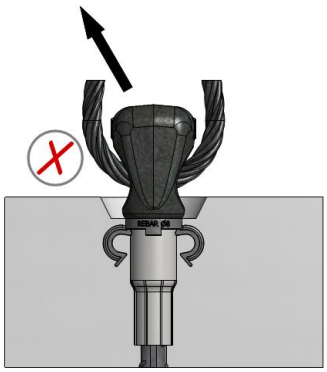


THS1-M	Product no.	Thread	THS1-Rd	Product no.	Thread	Load group	Axial load	L	d	l_1	Wire length
		M			Rd	[t]	[kN]	[mm]	[mm]	[mm]	[mm]
THS1-M12	45890	12	THS1-Rd12	46378	12	1.3	13	310	8	20	700
THS1-M16	45891	16	THS1-Rd16	46379	16	2.5	25	345	9	20	790
THS1-M20	45892	20	THS1-Rd20	46380	20	4.0	40	410	12	25	950
THS1-M24	45893	24	THS1-Rd24	46381	24	5.0	50	435	14	30	1035
THS1-M30	45894	30	THS1-Rd30	46382	30	7.5	75	490	16	37	1130
THS1-M36	46339	36	THS1-Rd36	46383	36	10.0	100	570	18	44	1310
THS1-M42	46340	42	THS1-Rd42	46384	42	12.5	125	650	20	51	1480
THS1-M52	46341	52	THS1-Rd52	46385	52	15.0	150	760	26	62	1765

Threaded Lifting Sling is made from high grade steel wire AISI 1010 (W 1.1121), swaged in a ferrule made of AlMg1.8 and a steel bolt made from high strength steel. It is zinc plated for protection against corrosion. Every Lifting System is individually tested at 3 times the working load and is supplied with a unique certificate. Each threaded lifting loop has a label marked with the admissible load, the thread type and the code number of the testing. Before use, you must check that the wires are in good condition. Do not use if the wire cable is bent, crushed or kinked and if there is any loosening of the outer layer. Reject if the wire is corroded. Ensure that the thread is fully bottomed out in the socket before lifting. It is permissible to back off one turn to ensure that the wire is correctly aligned for lifting.



Optimum load transfer is ensured if the eye bolt is orientated in load direction.



Diagonal or shear load is not permitted in this case.

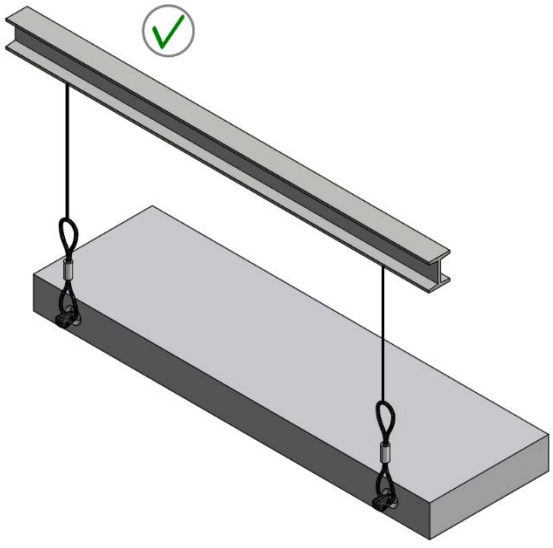
THS1 – APPLICATIONS

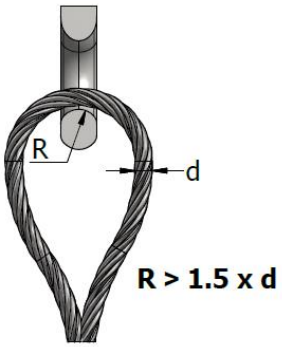
SCREWING DETAILS

Ensure that the thread is fully bottomed out in the socket before lifting. It is permissible to back off one turn to ensure that the wire is correctly aligned for lifting. **It is not accepted gap between concrete element and the body of the lifting system, the thread must be fully threaded inside the socket.**

The preferred option is the vertical lift. The angle of lift (ß) should normally not be more than 30°. Pulling back towards the unit is not acceptable.

ADDMISSIBLE LOAD DIRECTION

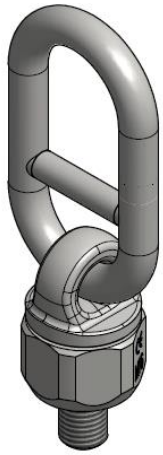


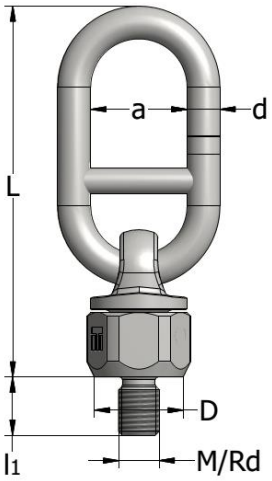


Note: *Minimum radius of the crane hook for the wire loop must be* ***R > 1.5 x d***

THREADED SWIVEL EYE – THS3

The Threaded Swivel Eye can be used for anchors with threaded sockets. They are suitable for most lifting situations, particularly for turning and tilting. They are more suitable for turning and tilting than the lifting systems manufactured from steel wire and can of course be reused, considered the regularly inspection. If they are kept in stores for reuse they must be inspected in accordance with local requirements. The Threaded Swivel Eye THS3. are made of high quality steel and they are designed with a safety factor of 5. Every Lifting System is individually tested at 3 times the working load and is supplied with a unique certificate.
The Threaded Swivel Eye should only be attached to the concrete unit and used after the concrete strength has reached 15 MPa. Usually they will be removed after the concrete elements are installed. This lifting system is suitable for use with threaded socket cast in flush with the surface of the unit or recessed using recess formers.
Ensure that the thread is fully mounted in the socket before lifting.





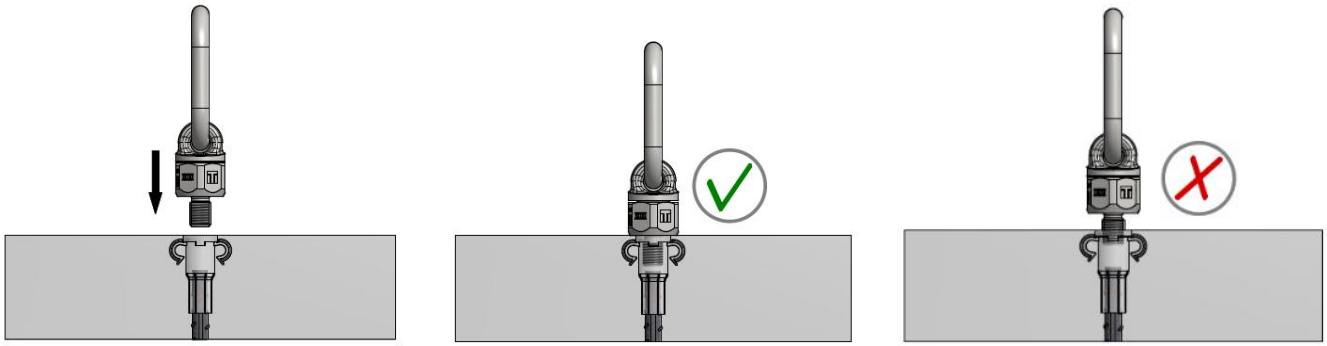
THS3-M	Product no.	Thread	Load group	Axial load	L	a	d	D	l_1
		M	[t]	[kN]	[mm]	[mm]	[mm]	[mm]	[mm]
THS3-HD-M12	61703	12	1.3	13	124	34	11	30	17
THS3-HD-M16	61704	16	2.5	25	145	38	13	35	23
THS3-HD-M20	61705	20	4.0	40	169	45	15	44	28.5
THS3-HD-M24	62748	24	5.0	50	198	49	17	44	33.5
THS3-HD-M30	62749	30	7.5	75	230	60	20	59	44.5
THS3-HD-M36	62750	36	10.0	100	264	64	24	59	53.5
THS3-HD-M42	62751	42	12.5	125	285	68	26	75	57.5
THS3-HD-M52	60828	52	15.0	150	307	72	31	84	67.5

THS3-Rd	Product no.	Thread	Load group	Axial load	L	a	d	D	l_1
		Rd	[t]	[kN]	[mm]	[mm]	[mm]	[mm]	[mm]
THS3-HD-Rd12	61706	12	1.3	13	124	34	11	30	17
THS3-HD-Rd16	61707	16	2.5	25	145	38	13	35	23
THS3-HD-Rd20	61708	20	4.0	40	169	45	15	44	28.5
THS3-HD-Rd24	62752	24	5.0	50	198	49	17	44	33.5
THS3-HD-Rd30	62753	30	7.5	75	230	60	20	59	44.5
THS3-HD-Rd36	62754	36	10.0	100	264	64	24	59	53.5
THS3-HD-Rd42	62755	42	12.5	125	285	68	26	75	57.5
THS3-HD-Rd52	60829	52	15.0	150	307	72	31	84	67.5

THS3 – APPLICATIONS

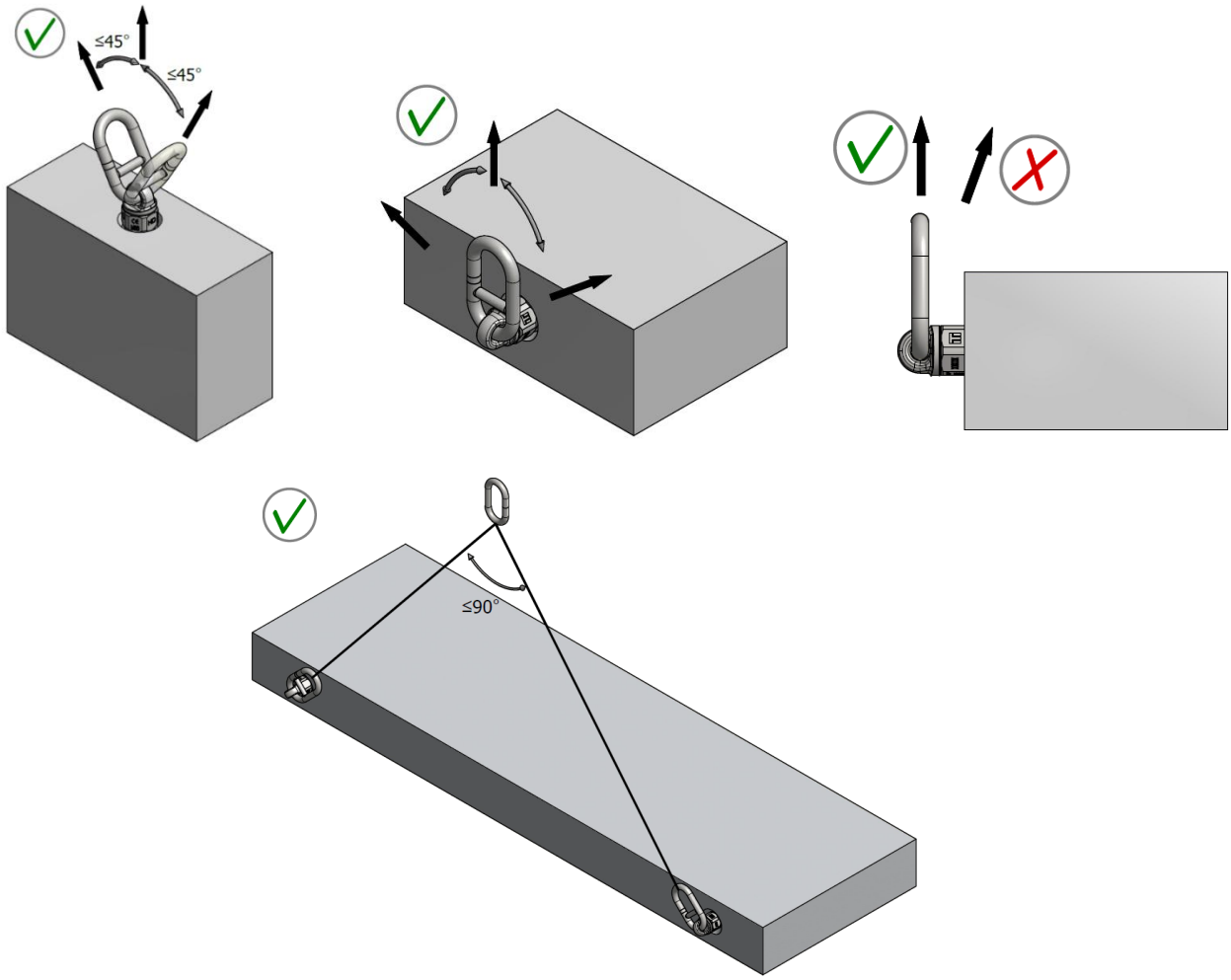
SCREWING DETAILS

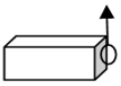
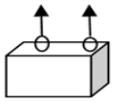
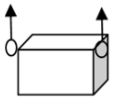
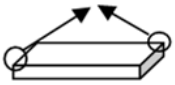
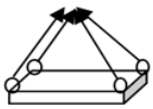
Ensure that the thread is fully bottomed out in the socket before lifting. It is permissible to back off one turn to ensure that the wire is correctly aligned for lifting. **It is not accepted gap between concrete element and the body of the lifting system, the thread must be fully threaded inside the socket.**



The preferred option is the vertical lift. The angle of lift (ß) should normally not be more than 30°. Pulling back towards the unit is not acceptable.

ADDMISSIBLE LOAD DIRECTION



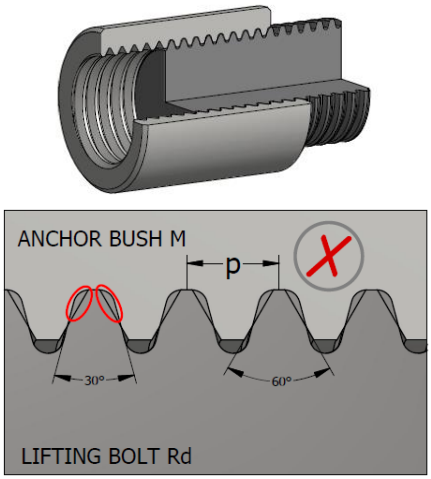
Number of pieces	1	1	2	2	2	2	3 or 4	3 or 4
Kind of attachment								
Inclination angle	0°	90°	0°	90°	0° - 45°	45° - 60°	0° - 45°	45° - 60°
THS3-M/Rd	WLL group	Axial load	Load group	Axial load	Load group	Axial load	Load group	Axial load
	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]
THS3-M/Rd12	5	2.5	10	5	3.5	2.5	5	3.5
THS3-M/Rd16	12	6.0	24	12	8.4	6.0	12	8.4
THS3-M/Rd20	20	10.0	40	20	14.0	10.0	20	14.0
THS3-M/Rd24	25	12.5	50	25	17.5	12.5	25	17.5
THS3-M/Rd30	40	20.0	80	40	28.0	20.0	40	28.0
THS3-M/Rd36	63	31.5	126	63	44.1	31.5	63	44.1
THS3-M/Rd42	80	40.0	160	80	56.0	40.0	80	56.0
THS3-M/Rd52	125	62.5	250	125	87.5	62.5	125	87.5

In case of an unsymmetrical load distribution; the lifting capacities applicable to the 2 and 3 or 4 leg slings are the same as for 1 leg types at 90°.
The preferred option is the vertical lift. The angle of lift (**ß**) should not normally be more than 30°. It is not acceptable pulling back towards the unit.

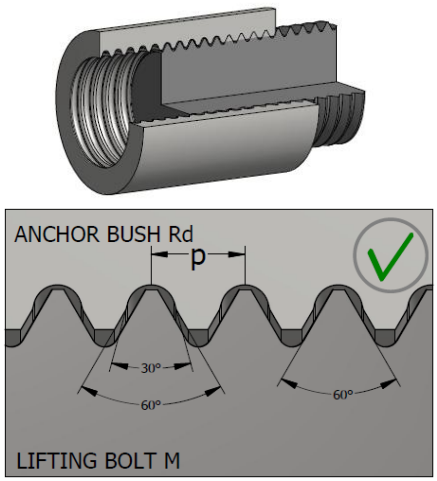
SPECIAL THREAD DESCRIPTION

Terwa special thread Rd is a mix of standard Rd thread and a metric thread according to DIN 13. It has metric screw pitches but a round thread geometry of thread flanks that contain a double angle of 60° and 30°. For that reason, an anchor with special Rd thread can be used in combination with both metric or Rd thread lifting system.

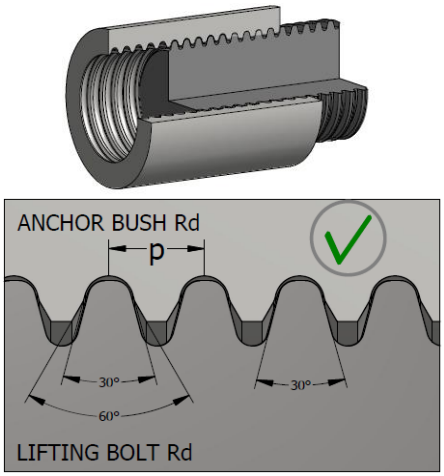
M thread bush and Rd thread bolt



Rd thread bush and metric thread bolt

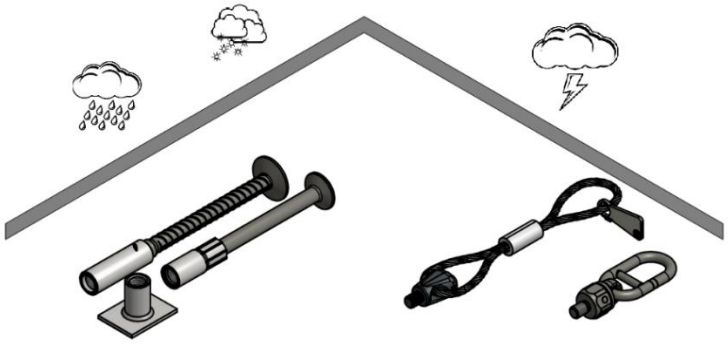


Rd thread bush and Rd thread bolt



STORAGE REQUIREMENTS

Lifting systems and anchors must be stored and protected in dry conditions, under a roof. Large temperature variations, snow, ice, humidity, or salt and sea water impact may cause damage to anchors and shorten the standing time.



SAFETY INSTRUCTIONS

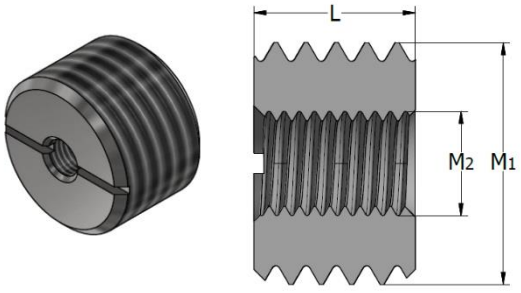
Lifting components must be used by experienced and trained personnel. This reduces the risk of severe damages and injury. Every lifting process must be made according to the instructions.

Obligatory instructions for safe working:

- All lifting anchors must be operated manually.
- Inspect lifting anchors visually before use, check and clean all lifting inserts prior to use.
- Hook in all lifting systems freely without requiring force.
- Respect local regulations for safe lifting and hoisting all times.

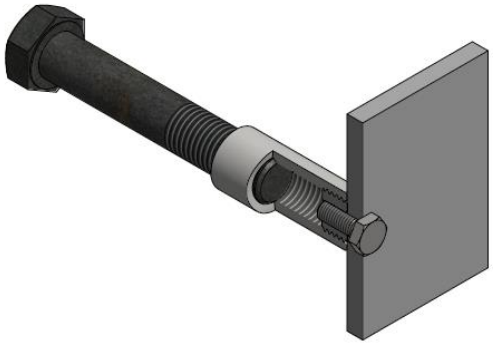
ACCESORIES

DOUBLE METRIC MOUNTING PLUG – SN



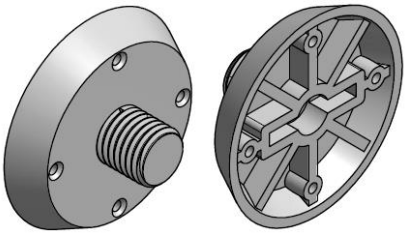
SN	Product no.	Thread M1	Thread M2	L [mm]
SN M12-M6	45214	12	6	16
SN M16-M8	45215	16	8	16
SN M20-M8	45216	20	8	16
SN M24-M8	46303	24	8	16
SN M24-M10	45217	24	10	16
SN M30-M10	45218	30	10	16
SN M30-M8	46079	30	8	16
SN M36-M10	45219	36	10	25
SN M42-M10	45220	42	10	30
SN M48-M10	45464	48	10	36
SN M48-M12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

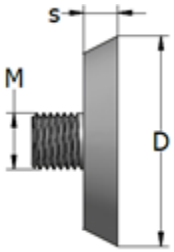
Double metric mounting plug SN is used for fixing the anchors or the lifting sockets on the formwork with a screw.



PLASTIC NAILING PLATE KU-10

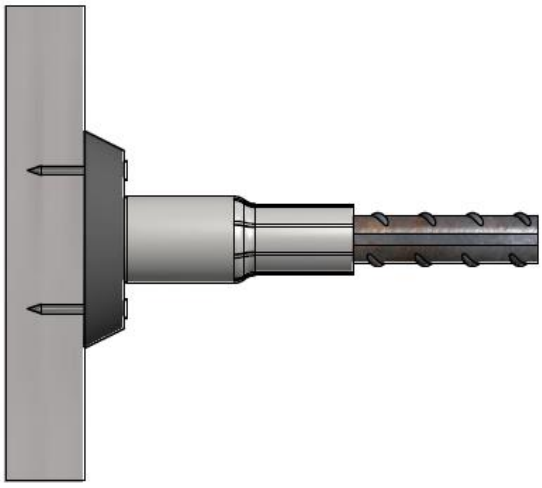
The nailing plates KU-10 are used for fixing the anchors and the lifting sockets to the formwork with nails. The fixing flange ensures a minimal recess around the head of the anchor. The recess is filled with fine concrete for protection against corrosion.





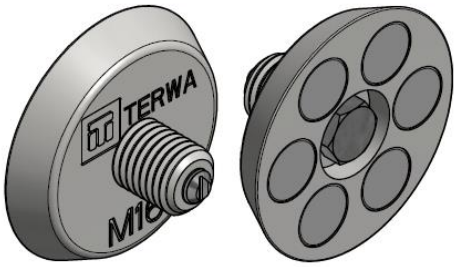
KU-10	Product no.	Thread	Diam. D	Diam. d	s	Color
		M	[mm]	[mm]	[mm]	
KU-10-M12	63246	12	47	37	10	Red RAL 3020
KU-10-M16	63256	16	47	37	10	Grey RAL 7043
KU-10-M20	63257	20	60	50	10	Green RAL 6024
KU-10-M24	63258	24	60	50	10	Blue RAL 5017
KU-10-M30	63259	30	73	63	10	Night blue RAL 5022
KU-10-M36	63260	36	73	63	10	Orange RAL 2009
KU-10-M42	63261	42	96	86	12	Brown RAL 8001
KU-10-M52	63262	52	96	86	12	Black RAL 9017

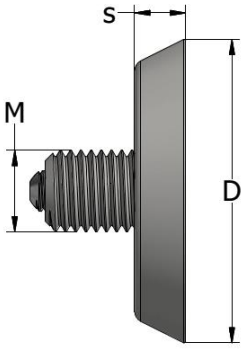
The plastic nailing plates KU-10 are nailed to formwork. Using forming wax on the nailing plate makes it easier to remove and screw on anchor or fixing insert. The anchor must be fastened to the reinforcement by suitable means so that it does not move during concreting. After stripping, unscrew.



STEEL MAGNETIC PLATE - TPM

The plates with magnets TPM are used for fixing the anchors and the lifting sockets to the steel formwork. The fixing flange ensures a minimal 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.





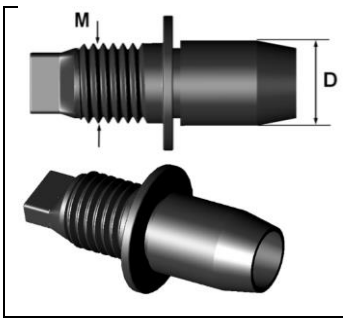
TPM-10	Product no.	Thread	Diam. D	s
		M	[mm]	[mm]
TPM-10-M12	47246	12	47	10
TPM-10-M16	48160	16	47	10
TPM-10-M20	48161	20	60	10
TPM-10-M24	48162	24	60	10
TPM-10-M30	47380	30	73	10
TPM-10-M36	48163	36	73	10
TPM-10-M42	48164	42	96	12
TPM-10-M52	48165	52	96	12

Note: the magnets have high strength so, please be careful with your hands when you mount it on the steel formwork.

BREAKABLE FIXING PIN – TBP

Breakable fixing pin TBP is used for fixing the anchors or the lifting sockets on the formwork. The Breakable fixing pin TBP is made of plastic nylon or polyamide 6.
Working method:

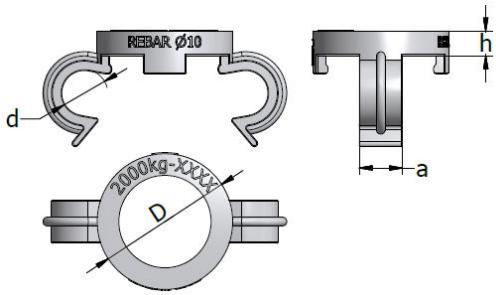
- Insert the Breakable fixing pin TBP in to the formwork.
- Screw the anchor or the fixing insert onto the fixing pin TBP
- Pour concrete.
- Remove the formwork, the fixing pin will break in the formwork.
- Remove the remained part of the fixing pin just before using the thread of the anchor.



TBP	Product no.	Thread	D
		M	[mm]
TBP-M12	45652	12	11
TBP-M16	45653	16	17
TBP-M20	45654	20	17
TBP-M24	45655	24	17

DATA CLIP

With the Terwa DATA CLIP it is easy to identify the lifting anchor embedded in concrete. On this ring is clearly marked the size, the maximum working load, the additional reinforcement steel diameter and manufacturer. In the same time, each DATA CLIP has a unique color code related to the load group of the anchor. The product haves two lateral wings which permit the easy mounting of the additional reinforcement steel on the anchor in a safe zone with a lifting capacity of 100% of the anchor.

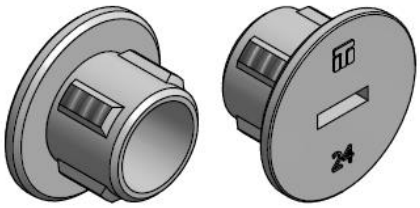


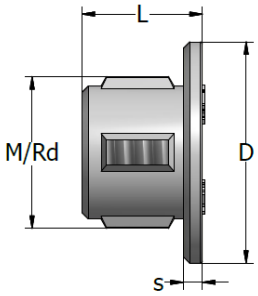
DATA CLIP	Product no.	Thread	D	h	a	d	Color
		M	[mm]	[mm]	[mm]	[mm]	
DATA CLIP -M12	62651	12	20.5	4	6.5	6.5	Red RAL 3020
DATA CLIP -M16	62652	16	26.5	5	7.5	8.5	Dark grey RAL 7043
DATA CLIP -M20	62653	20	31.5	6	10	10.5	Green RAL 6024
DATA CLIP -M24	62654	24	36.5	6	10	10.5	Blue RAL 5017
DATA CLIP -M30	62655	30	43.5	6	15	12.5	Light grey RAL 7004
DATA CLIP -M36	62656	36	52.5	8	18	17	Orange RAL 2009
DATA CLIP -M42	62657	42	60.5	8	19.5	20	Yellow RAL 1023
DATA CLIP -M52	62658	52	73.5	9	22	20	Black RAL 9017

DATA CLIP	Product no.	Thread	D	h	a	d	Color
		Rd	[mm]	[mm]	[mm]	[mm]	
DATA CLIP -Rd12	62659	12	20.5	4	6.5	6.5	Red RAL 3020
DATA CLIP -Rd16	62660	16	26.5	5	7.5	8.5	Dark grey RAL 7043
DATA CLIP -Rd20	62661	20	31.5	6	10	10.5	Green RAL 6024
DATA CLIP -Rd24	62662	24	36.5	6	10	10.5	Blue RAL 5017
DATA CLIP -Rd30	62663	30	43.5	6	15	12.5	Light grey RAL 7004
DATA CLIP -Rd36	62664	36	52.5	8	18	17	Orange RAL 2009
DATA CLIP -Rd42	62665	42	60.5	8	19.5	20	Yellow RAL 1023
DATA CLIP -Rd52	62666	52	73.5	9	22	20	Black RAL 9017

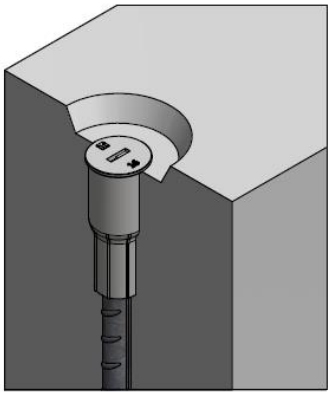
PLASTIC PLUG

Plastic plugs are used to cover the bush and protect the sockets against the rust or dirt. Are available in concrete grey color so, can remain in the concrete element after installation with a good aspect of the element.





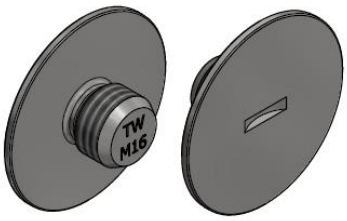
PLASTIC PLUG	Product no.	Thread	Diam. D	L	s
		M/Rd	[mm]	[mm]	[mm]
PLASTIC PLUG -M/Rd12	62768	12	18	12	1.5
PLASTIC PLUG -M/Rd16	62769	16	25	15	2
PLASTIC PLUG -M/Rd20	62770	20	32	18	3
PLASTIC PLUG -M/Rd24	62771	24	35	19	3
PLASTIC PLUG -M/Rd30	62772	30	44	23.5	3
PLASTIC PLUG -M/Rd36	62773	36	53	26	3
PLASTIC PLUG -M/Rd42	62774	42	60	27	3
PLASTIC PLUG -M/Rd52	62775	52	73	32	3

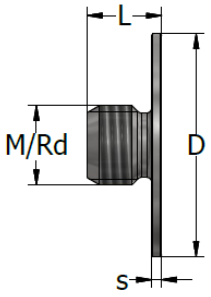


After remove the KU Nailing plate mount the plastic plug inside the socket.
Also, can be used for protection the thread of the socket anchors before installation to prevent the dirt to get into the thread zone of the anchor.

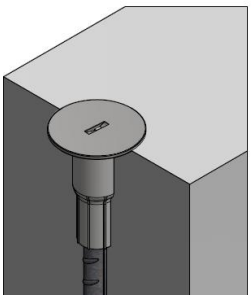
COVER SEALING CAP TP-02

The Cover Sealing Cap is made of Stainless Steel and have the purpose to protect the socket and a nice look on the concrete element.





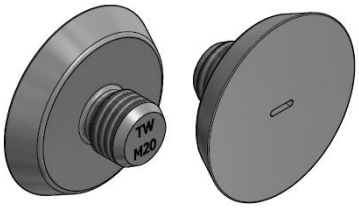
COVER SEALING CAP	Product no.	Thread	Diam. D	L	s
		M/Rd	[mm]	[mm]	[mm]
M/Rd12	61526	12	35	15	2
M/Rd16	61527	16	35	15	2
M/Rd20	61528	20	44	18	2
M/Rd24	61529	24	44	25	2
M/Rd30	61530	30	59	25	2
M/Rd36	61531	36	59	30	2

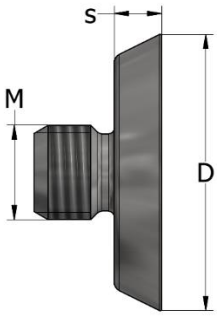


Mount the Cap in the socket after remove the Nailing plate.

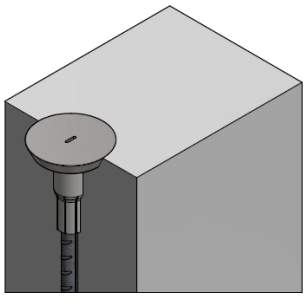
COVER SEALING CAP

The Cover Sealing Cap is made of Stainless Steel and have the purpose to protect the socket and a nice look on the concrete element.





COVER SEALING CAP	Product no.	Thread	Diam. D	s
		M/Rd	[mm]	[mm]
M/Rd12	63115	12	45	10
M/Rd16	63116	16	45	10
M/Rd20	63117	20	54	10
M/Rd24	63118	24	54	10
M/Rd30	63119	30	69	10
M/Rd36	63120	36	69	10
M/Rd42	63121	42	94	12



Mount the Cap in the socket after remove the Nailing plate.

ALL SPECIFICATIONS CAN BE CHANGED WITHOUT PREVIOUS NOTICE.

DISCLAIMER