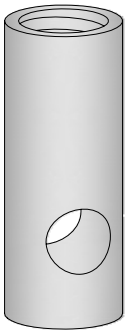
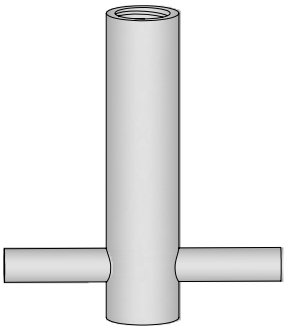
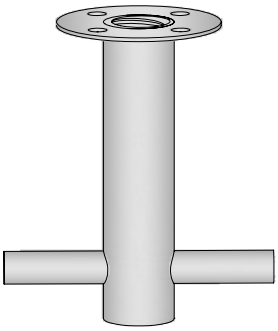
Threaded Concrete Anchors

SALON TUKITUOTE

Instructions of use

		
Concrete Anchors № 300 and № 301 (pages 2-9)	**Concrete Anchors № 310 and № 311** (pages 10-17)	**Concrete Anchor № 410** (pages 18-23)

Concrete Anchors №300 and №301

The Concrete Anchors are made for lifting and fastening of precast concrete products.

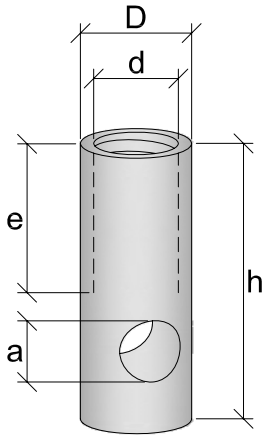
Concrete Anchors can be used in concrete C20/25 and the minimum necessary surface reinforcement.

Concrete Anchor with anchorage reinforcement is set into the concrete before the casting and serves a basis for Lifting Loops LL, Lifting Loops “Goliath”, Lifting Loops with Pressure Plate and LiftingEye.

There is the half-round metric thread Rd or a metric thread in the Concrete Anchors, which should be greased before the installation into the precast concrete unit. The fastening details equipped with normal metric standard thread can be fastened to the thread.

For fastening to a steel formwork, magnetic holders models HM4 are recommended. To prevent dirt and concrete from penetrating into the thread of the socket, external caps or holding discs are used. Holding discs are used to fasten anchors to a wooden formwork.

The cast-in concrete inserts are manufactured in accordance with the product declaration approved by the concrete Association of Finland, and the company has included a quality control contract with SFS-InspectaSertifiointiOy.



Materials:

- steel S355, bright
- zinc-plated
- stainless steel A2
- stainless steel A4

Table 1: Concrete Anchor №300with metric thread (steel S355, bright)

Article	Type	d [mm]	h [mm]	D [mm]	e [mm]	a [mm]
00101	M10×45	10	45	15	18	8
00103	M10×60	10	60	15	18	8
00104	M12×50	12	50	18	22	10
00105	M12×70	12	70	18	25	10
00106	M16×50	16	50	22	22	10
00107	M16×70	16	70	22	27	10
00108	M16×90	16	90	22	27	10
00109	M20×100	20	100	25	30	12
00110	M20×120	20	120	25	30	12
00111	M24×120	24	120	35	40	15
00112	M24×150	24	150	35	40	15

Table2: Concrete Anchor №301 with Rd thread (steel S355, bright)

Article	Type	d [mm]	h [mm]	D [mm]	e [mm]	a [mm]
Rd104	Rd12×50	12	50	18	22	10
Rd105	Rd12×70	12	70	18	25	10
Rd106	Rd16×50	16	50	22	22	10
Rd107	Rd16×70	16	70	22	27	10
Rd108	Rd16×90	16	90	22	27	10
Rd109	Rd20×100	20	100	25	30	12
Rd110	Rd20×120	20	120	25	30	12
Rd111	Rd24×120	24	120	35	40	15
Rd112	Rd24×150	24	150	35	40	15

Table 3: Concrete Anchor №300S with metric thread (zinc-plated)

Article	Type	d [mm]	h [mm]	D [mm]	e [mm]	a [mm]
00200	M10×45	10	45	15	18	8
00201	M10×60	10	60	15	18	8
00202	M12×50	12	50	18	22	10
00203	M12×70	12	70	18	25	10
00204	M16×50	16	50	22	22	10
00205	M16×70	16	70	22	27	10
00206	M16×90	16	90	22	27	10
00207	M20×100	20	100	25	30	12
00208	M20×120	20	120	25	30	12
00209	M24×120	24	120	35	40	15
00210	M24×150	24	150	35	40	15

Table 4: Concrete Anchor №301S with Rd thread (zinc-plated)

Article	Type	d [mm]	h [mm]	D [mm]	e [mm]	a [mm]
Rd202	Rd12×50	12	50	18	22	10
Rd203	Rd12×70	12	70	18	25	10
Rd204	Rd16×50	16	50	22	22	10
Rd205	Rd16×70	16	70	22	27	10
Rd206	Rd16×90	16	90	22	27	10
Rd207	Rd20×100	20	100	25	30	12
Rd208	Rd20×120	20	120	25	30	12
Rd209	Rd24×120	24	120	35	40	15
Rd210	Rd24×150	24	150	35	40	15

Table 5: Concrete Anchor №300Rwith metric thread (stainless steel)

Article	Type	d [mm]	h [mm]	D [mm]	e [mm]	a [mm]
00300	M10×45	10	45	15	18	8
00301	M10×60	10	60	15	18	8
00302	M12×50	12	50	18	22	10
00303	M12×70	12	70	18	25	10
00304	M16×50	16	50	22	22	10
00305	M16×70	16	70	22	27	10
00306	M16×90	16	90	22	27	10
00307	M20×100	20	100	25	30	12
00308	M20×120	20	120	25	30	12
00309	M24×120	24	120	35	40	15
00310	M24×150	24	150	35	40	15

Table 6: Concrete Anchor №301Rwith Rd thread (stainless steel)

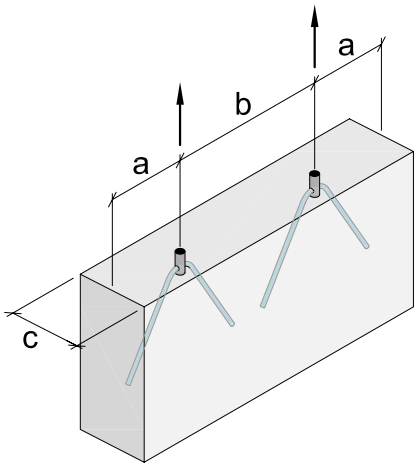
Article	Type	d [mm]	h [mm]	D [mm]	e [mm]	a [mm]
Rd302	Rd12×50	12	50	18	22	10
Rd303	Rd12×70	12	70	18	25	10
Rd304	Rd16×50	16	50	22	22	10
Rd305	Rd16×70	16	70	22	27	10
Rd306	Rd16×90	16	90	22	27	10
Rd307	Rd20×100	20	100	25	30	12
Rd308	Rd20×120	20	120	25	30	12
Rd309	Rd24×120	24	120	35	40	15
Rd310	Rd24×150	24	150	35	40	15

Installation Instructions for Concrete Anchors

1. Spacing of Concrete Anchors and edge distances

Table 7: Minimal dimensions

Type	a_{min} [mm]	b_{min} [mm]	c_{min} [mm]
M10×45	400	200	65
M10×60	400	200	90
M/Rd12×50	400	200	75
M/Rd12×70	400	200	105
M/Rd16×50	400	200	75
M/Rd16×70	400	200	105
M/Rd16×90	400	200	135
M/Rd20×100	400	200	150
M/Rd20×120	480	240	180
M/Rd24×120	480	240	180
M/Rd24×150	600	300	225

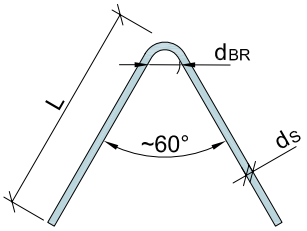


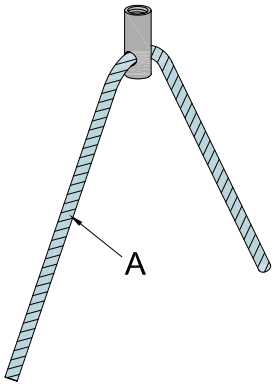
2. Anchorage reinforcement

Table 8: Reinforcement bar A

Type	d_S [mm]	d_{BR} [mm]	L [mm]
M10	6	24	220
M/Rd 12	6	24	220
M/Rd 16	10	40	310
M/Rd 20	12	48	430

A reinforcement bar :





The reinforcement bar must be tightly pressed!

Concrete Anchors with reinforcement bars can be used with **straight pull** without any further reinforcement.

3. Permissible loads

Application as load transferring metal parts:

Table 9 lists the calculated values of cast-in concrete inserts' tensile and shearing capacities, when the inserts are being used as load transferring metal parts other than lifting anchors. The calculated loads of the cast-in concrete inserts (the nominal load, indicated by the partial safety factor) must be smaller than the calculated value of the tensile or shearing capacities.
The established calculated capacity values presume that the attached structural fastening devices (threaded pins and screws) are screwed in the entire length of the thread.

The calculated capacity values provided in Table 9 have been obtained by dividing the nominal capacity by the coefficient depending on the fracturing pattern of the fastening. Since the fracture was caused by fracturing of the concrete in the fastening base, the value 1.5 (reinforced structure) should be taken for the safety factor. Furthermore, in case of brittle fracture of the insert anchoring, the additional safety factor 1.2 is applied.

The fastening shall be designed so as to ensure that failure of the fastening of one of the cast-in inserts does not lead to a successive collapse, and thus the disconnection of the structural part or equipment being fastened. At least two cast-in concrete inserts fails the load applied to the remaining inserts must be lower than their double calculated capacity.

The calculated values of the tensile and shearing capacities of the load transferring cast-in concrete inserts for the concrete type C20/25. Not used for lifting of elements.
Reference: *The measured values of the tensile and shearing capacities of cast-in concrete inserts are provided in VTT survey report No (Cast-in concrete inserts M10-M20) and RTE3328/05 9.9.2005 (Lifting Anchors M24)*

Table 9: Cast-in concrete inserts

Type	Calculated tensile capacity value [kN]	Calculated shearing capacity value [kN]
M10×45	9.6	-
M10×60	11.5	-
M/Rd12×50	10.8	12.3
M/Rd12×70	18.9	19.8
M/Rd16×50	10.8	13.6
M/Rd16×70	19.9	19.8
M/Rd16×90	27.0	21.1
M/Rd20×100	30.9	37.3
M/Rd20×120	40.0	40.7
M/Rd24×120	39.4	45.2
M/Rd24×150	52.2	61.7

Application of cast-in concrete inserts for lifting anchors:

VTT research report No RTE3261/04 8.10.2004 for cast-in concrete insert types No 310, 310R, 310H, 410, 410R, 410H (sizes M / Rd12—M / Rd20), applying the concrete strength class C20/25, and **RTE 3328/05 9.9.2005** for lifting anchors No 310, 310R, 310H, 410, 410R, 410H (sizes M / Rd24)

Pursuant to the Finnish National Building Code (Rak MK), Part B4, clause 2.6.1.5, the load, which is at least four times the load caused by the element, shall be applied as the calculated load for a lifting anchor and its fastening. Table 10 presents the permissible vertical load of a cast-in concrete insert (element's permitted weight) with the lifting angle value of 0° (vertical lift) 30° and 60°. The lifting angle 90° represents the permissible shear force of a cast-in concrete insert. The lifting angle means the angle between the lifting cable and a vertical line.

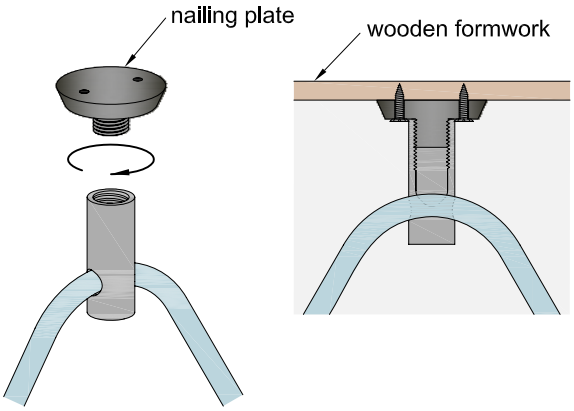
The permissible vertical load of a lifting anchor (permissible element weight) [kN] with the lifting angle values 0°, 30°, 60° and the permissible shear force of a cast-in concrete insert (lifting angle 90°) for reinforced concrete C20/25.
Reference: *The measured values of cast-in concrete inserts are provided in VTT survey report No (Cast-in concrete inserts M12-M20) and RTE3328/05 9.9.2005 (Lifting Anchors M24)*

Table 10: Lifting Anchors

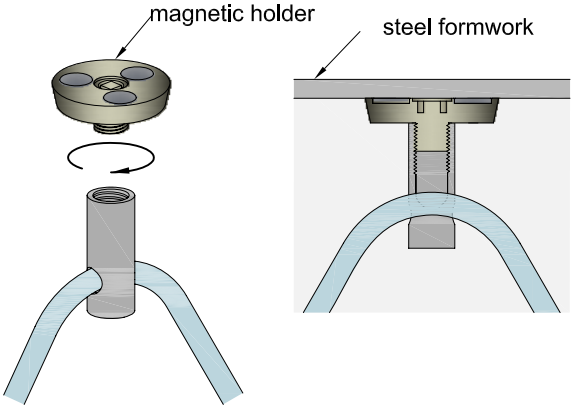
Type	Permissible vertical load (element weight) [kN]			
	Lifting angle:			
	0° (vertical lift)	30°	60°	90° (permissible shear force)
M10×45	4.9	3.9	2.3	5.6
M10×60	9.0	6.8	3.9	8.9
M/Rd12×50	4.9	4.0	2.5	6.2
M/Rd12×70	9.0	6.8	3.9	8.9
M/Rd16×50	12.6	8.6	4.6	9.5
M/Rd16×70	13.9	11.3	6.9	16.8
M/Rd16×90	18.0	13.8	8.0	18.4
M/Rd20×100	17.8	14.2	8.5	20.4
M/Rd20×120	23.5	18.9	11.4	27.8
M/Rd24×120	17.8	14.2	8.5	20.4
M/Rd24×150	23.5	18.9	11.4	27.8

4. Accessories of Installation

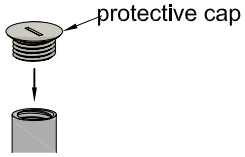
Nailing Plate (for more information, look at brochure “Threaded Lifting System”, page 5) are used when is necessary to fasten Concrete Anchors to a wooden formwork. They eliminate the possibility of getting concrete or pollution into the sockets.



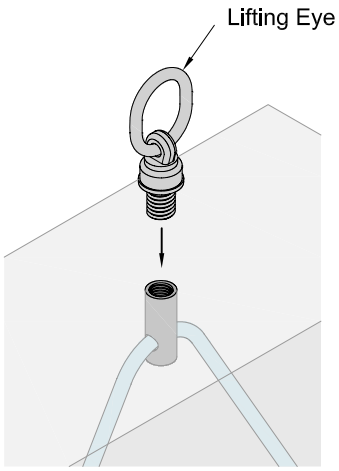
Magnetic Holder – Type HM4 (for more information, look at brochure “Threaded Lifting System”, pages 2-4) are used when is necessary to fasten Concrete Anchors to a steel formwork

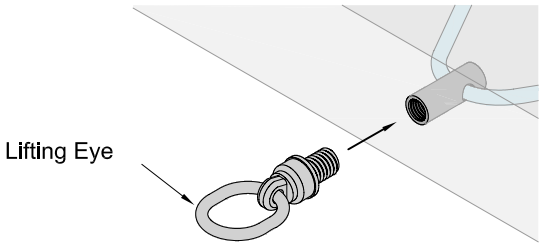


Protective Caps (for more information, look at brochure “Threaded Lifting System”, page 6) are used to seal Concrete Anchor and prevent various substances such as residual concrete, dust, snow etc. from penetrating into the Concrete Anchor, protecting the anchor thread from clogging up.



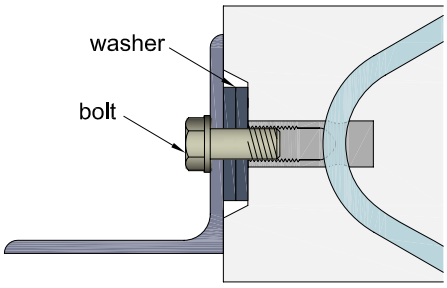
Lifting Eye, TreadedLifting Loop LL, Threaded Lifting Loop with pressure plate and Lifting Loop "Goliath" (for more information,look at brochure "Threaded System Accessories" page 8-15) are to be used as lifting devices of the Thread System. They must be completely screwed into the Concrete Anchor.





5. Fixing component

An element is attached to the Concrete Anchor with a standard metric thread fastening bolt and washer.



Concrete Anchors № 310 and № 311

The Concrete Anchors are made for lifting and fastening of precast concrete products.

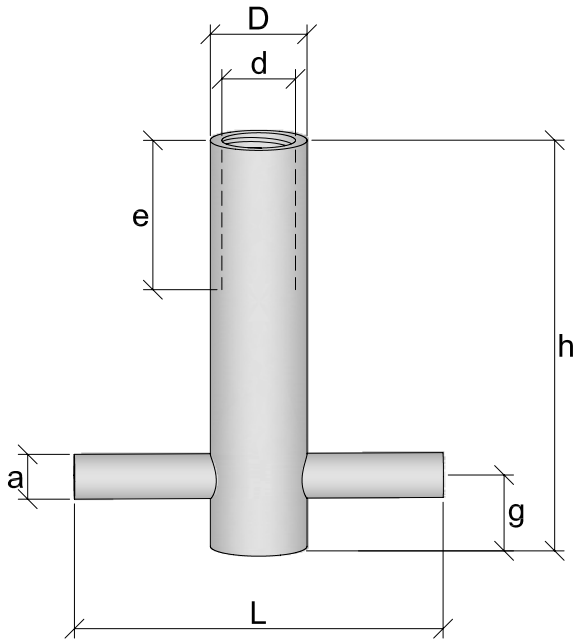
Concrete Anchors can be used in concrete C20/25 and the minimum necessary surface reinforcement.

Concrete Anchor with anchorage reinforcement is set into the concrete before the casting and serves a basis for Lifting Loops LL, Lifting Loops "Goliath", Lifting Loops with Pressure Plate and Lifting Eye.

There is the half-round metric thread Rd or a metric thread in the Concrete Anchors, which should be greased before the installation into the precast concrete unit. The fastening details equipped with normal metric standard thread can be fastened to the thread.

For fastening to a steel formwork, magnetic holders models HM4 are recommended. To prevent dirt and concrete from penetrating into the thread of the socket, protective caps or nailing plates are used. Holding discs are used to fasten anchors to a wooden formwork.

The cast-in concrete anchors are manufactured in accordance with the product declaration approved by the concrete Association of Finland, and the company has included a quality control contract with SFS-Inspecta Sertifiointi Oy.



Materials:

- steel S355, polished or
- zinc-plated or
- stainless steel A2
- stainless steel A4

Table 1: Concrete Anchor № 310 with metric thread (steel S355, polished)

Article	Type	d [mm]	h [mm]	D [mm]	e [mm]	a [mm]	g [mm]	L [mm]
00400	M10×45	10	45	15	18	8	12	65
00401	M10×60	10	60	15	18	8	15	65
00402	M12×50	12	50	18	22	10	12	80
00403	M12×70	12	70	18	25	10	15	80
00404	M16×50	16	50	22	22	10	12	80
00405	M16×70	16	70	22	27	10	15	80
00406	M16×90	16	90	22	27	10	15	80
00407	M20×100	20	100	25	30	12	25	95
00408	M20×120	20	120	25	30	12	25	95
00409	M24×120	24	120	32	40	15	30	120
00410	M24×150	24	150	32	40	15	30	120

Table 2: Concrete Anchor № 311 with Rd thread (steel S355, polished)

Article	Type	d [mm]	h [mm]	D [mm]	e [mm]	a [mm]	g [mm]	L [mm]
Rd402	Rd12×50	12	50	18	22	10	12	80
Rd403	Rd12×70	12	70	18	25	10	15	80
Rd404	Rd16×50	16	50	22	22	10	12	80
Rd405	Rd16×70	16	70	22	27	10	15	80
Rd406	Rd16×90	16	90	22	27	10	15	80
Rd407	Rd20×100	20	100	25	30	12	25	95
Rd408	Rd20×120	20	120	25	30	12	25	95
Rd409	M24×120	24	120	32	40	15	30	120
Rd410	M24×150	24	150	32	40	15	30	120

Table 3: Concrete Anchor № 310ZN with metric thread (zinc-plated)

Article	Type	d [mm]	h [mm]	D [mm]	e [mm]	a [mm]	g [mm]	L [mm]
00500	M10×45	10	45	15	18	8	12	65
00501	M10×60	10	60	15	18	8	15	65
00502	M12×50	12	50	18	22	10	12	80
00503	M12×70	12	70	18	25	10	15	80
00504	M16×50	16	50	22	22	10	12	22
00505	M16×70	16	70	22	27	10	15	22
00506	M16×90	16	90	22	27	10	15	22
00507	M20×100	20	100	25	30	12	25	25
00508	M20×120	20	120	25	30	12	25	25
00509	M24×120	24	120	35	40	15	30	35
00510	M24×150	24	150	35	40	15	30	35

Table 4: Concrete Anchor № 311ZN with Rd thread (zinc-plated)

Article	Type	d [mm]	h [mm]	D [mm]	e [mm]	a [mm]	g [mm]	L [mm]
Rd502	Rd12×50	12	50	18	22	10	12	80
Rd503	Rd12×70	12	70	18	25	10	15	80
Rd504	Rd16×50	16	50	22	22	10	12	22
Rd505	Rd16×70	16	70	22	27	10	15	22
Rd506	Rd16×90	16	90	22	27	10	15	22
Rd507	Rd20×100	20	100	25	30	12	25	25
Rd508	Rd20×120	20	120	25	30	12	25	25
Rd509	M24×120	24	120	35	40	15	30	35
Rd510	M24×150	24	150	35	40	15	30	35

Table 5: Concrete Anchor № 310R with metric thread (stainless steel)

Article	Type	d [mm]	h [mm]	D [mm]	e [mm]	a [mm]	g [mm]	L [mm]
00600	M10×45	10	45	15	18	8	12	65
00601	M10×60	10	60	15	18	8	15	65
00602	M12×50	12	50	18	22	10	12	80
00603	M12×70	12	70	18	25	10	15	80
00604	M16×50	16	50	22	22	10	12	80
00605	M16×70	16	70	22	27	10	15	80
00606	M16×90	16	90	22	27	10	15	80
00607	M20×100	20	100	25	30	12	25	95
00608	M20×120	20	120	25	30	12	25	95
00609	M24×120	24	120	32	40	15	30	120
00610	M24×150	24	150	32	40	15	30	120

Table 6: Concrete Anchor № 311R with Rd thread (stainless steel)

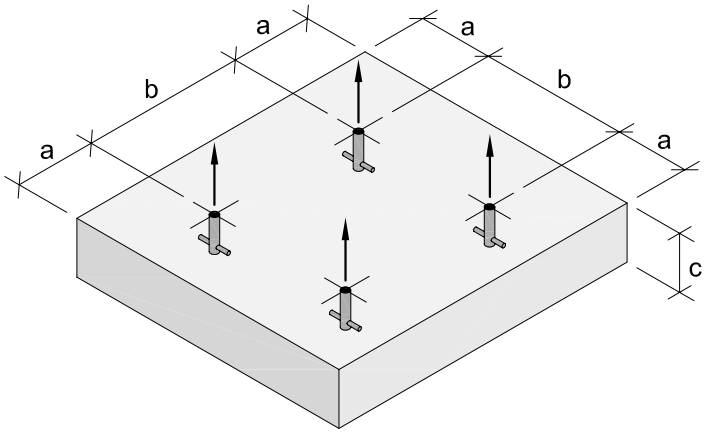
Article	Type	d [mm]	h [mm]	D [mm]	e [mm]	a [mm]	g [mm]	L [mm]
Rd602	Rd12×50	12	50	18	22	10	12	80
Rd603	Rd12×70	12	70	18	25	10	15	80
Rd604	Rd16×50	16	50	22	22	10	12	22
Rd605	Rd16×70	16	70	22	27	10	15	22
Rd606	Rd16×90	16	90	22	27	10	15	22
Rd607	Rd20×100	20	100	25	30	12	25	25
Rd608	Rd20×120	20	120	25	30	12	25	25
Rd609	M24×120	24	120	35	40	15	30	35
Rd610	M24×150	24	150	35	40	15	30	35

Installation Instructions for Concrete Anchors

1. Spacing of Concrete Anchors and edge distances

Table 7: Minimal dimensions

Type	a_{min} [mm]	b_{min} [mm]	c_{min} [mm]
M10×45	400	200	65
M10×60	400	200	90
M/Rd12×50	400	200	75
M/Rd12×70	400	200	105
M/Rd16×50	400	200	75
M/Rd16×70	400	200	105
M/Rd16×90	400	200	135
M/Rd20×100	400	200	150
M/Rd20×120	480	240	180
M/Rd24×120	480	240	180
M/Rd24×150	600	300	225



2. Permissible loads

Application as load transferring metal parts:

Table 8 lists the calculated values of cast-in concrete inserts' tensile and shearing capacities, when the inserts are being used as load transferring metal parts other than lifting anchors. The calculated loads of the cast-in concrete inserts (the nominal load, indicated by the partial safety factor) must be smaller than the calculated value of the tensile or shearing capacities.
The established calculated capacity values presume that the attached structural fastening devices (threaded pins and screws) are screwed in the entire length of the thread.

The calculated capacity values provided in Table 8 have been obtained by dividing the nominal capacity by the coefficient depending on the fracturing pattern of the fastening. Since the fracture was caused by fracturing of the concrete in the fastening base, the value 1.5 (reinforced structure) should be taken for the safety factor. Furthermore, in case of brittle fracture of the insert anchoring, the additional safety factor 1.2 is applied.

The fastening shall be designed so as to ensure that failure of the fastening of one of the cast-in inserts does not lead to a successive collapse, and thus the disconnection of the structural part or equipment being fastened. At least two cast-in concrete inserts fails the load applied to the remaining inserts must be lower than their double calculated capacity.

The calculated values of the tensile and shearing capacities of the load transferring cast-in concrete inserts for the concrete type C20/25. Not used for lifting of elements.

Reference: *The measured values of the tensile and shearing capacities of cast-in concrete inserts are provided in VTT survey report No (Cast-in concrete inserts M10-M20) and RTE3328/05 9.9.2005 (Lifting Anchors M24)*

Table 8: Cast-in concrete inserts

Type	Calculated tensile capacity value [kN]	Calculated shearing capacity value [kN]
M10×45	9.6	-
M10×60	11.5	-
M/Rd12×50	10.8	12.3
M/Rd12×70	18.9	19.8
M/Rd16×50	10.8	13.6
M/Rd16×70	19.9	19.8
M/Rd16×90	27.0	21.1
M/Rd20×100	30.9	37.3
M/Rd20×120	40.0	40.7
M/Rd24×120	39.4	45.2
M/Rd24×150	52.2	61.7

Application of cast-in concrete inserts for lifting anchors:

VTT research report No RTE3261/04 8.10.2004 for cast-in concrete insert types No 310, 310R, 310H, 410, 410R, 410H (sizes M / Rd12—M / Rd20), applying the concrete strength class C20/25, and **RTE 3328/05 9.9.2005** for lifting anchors No 310, 310R, 310H, 410, 410R, 410H (sizes M / Rd24)

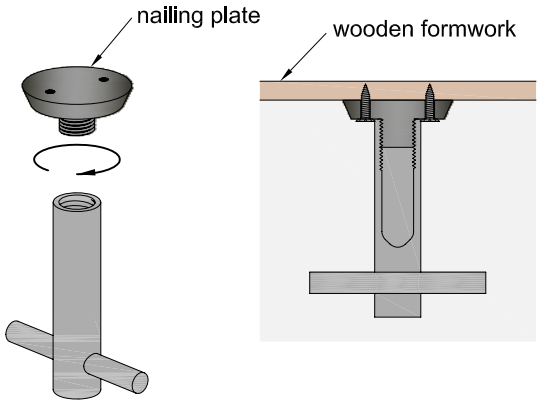
Pursuant to the Finnish National Building Code (Rak MK), Part B4, clause 2.6.1.5, the load, which is at least four times the load caused by the element, shall be applied as the calculated load for a lifting anchor and its fastening. Table 9 presents the permissible vertical load of a cast-in concrete insert (element's permitted weight) with the lifting angle value of 0° (vertical lift) 30° and 60°. The lifting angle 90° represents the permissible shear force of a cast-in concrete insert. The lifting angle means the angle between the lifting cable and a vertical line.

The permissible vertical load of a lifting anchor (permissible element weight) [kN] with the lifting angle values 0°, 30°, 60° and the permissible shear force of a cast-in concrete insert (lifting angle 90°) for reinforced concrete C20/25.
Reference: *The measured values of cast-in concrete inserts are provided in VTT survey report No (Cast-in concrete inserts M12-M20) and RTE3328/05 9.9.2005 (Lifting Anchors M24)*

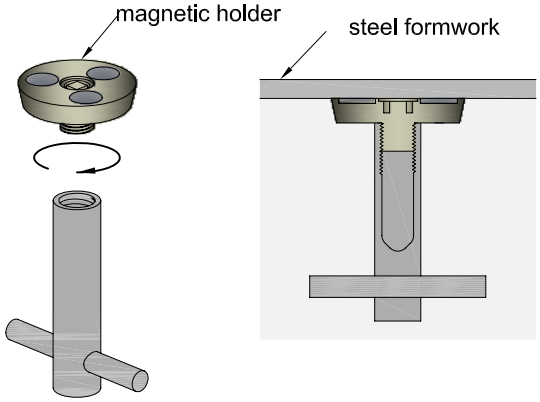
Table 9: Lifting Anchors

Type	Permissible vertical load (element weight) [kN]			
	Lifting angle:			
	0° (vertical lift)	30°	60°	90° (permissible shear force)
M10×45	4.9	3.9	2.3	5.6
M10×60	9.0	6.8	3.9	8.9
M/Rd12×50	4.9	4.0	2.5	6.2
M/Rd12×70	9.0	6.8	3.9	8.9
M/Rd16×50	12.6	8.6	4.6	9.5
M/Rd16×70	13.9	11.3	6.9	16.8
M/Rd16×90	18.0	13.8	8.0	18.4
M/Rd20×100	17.8	14.2	8.5	20.4
M/Rd20×120	23.5	18.9	11.4	27.8
M/Rd24×120	17.8	14.2	8.5	20.4
M/Rd24×150	23.5	18.9	11.4	27.8

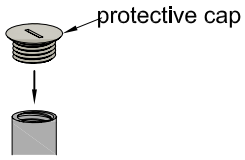
3. Accessories of Installation



Nailing Plate (for more information, look at brochure “Threaded Lifting System”, page 5) are used when is necessary to fasten Concrete Anchors to a wooden formwork. They eliminate the possibility of getting concrete or pollution into the sockets.

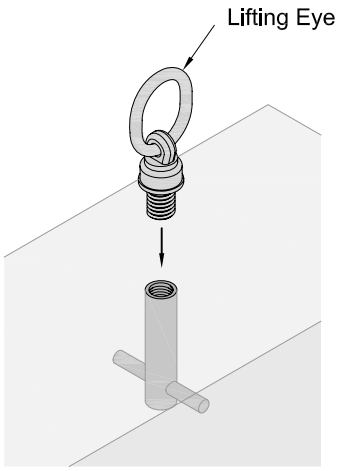


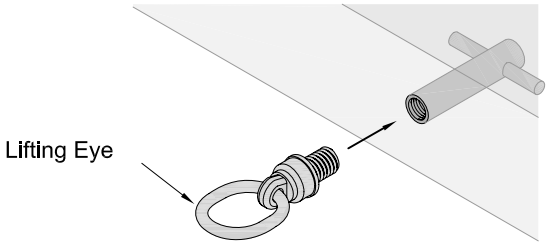
Magnetic Holder – Type HM4 (for more information, look at brochure “Threaded Lifting System”, pages 2-4) are used when is necessary to fasten Concrete Anchors to a steel formwork



Protective Caps (for more information, look at brochure “Threaded Lifting System”, page 6) are used to seal Concrete Anchor and prevent various substances such as residual concrete, dust, snow etc. from penetrating into the Concrete Anchor, protecting the anchor thread from clogging up.

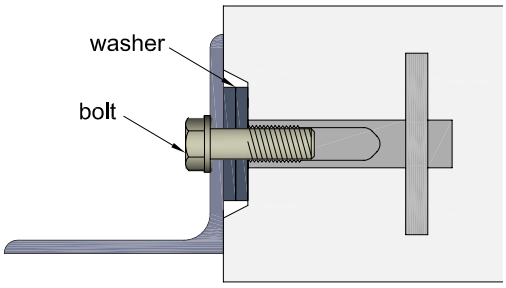
Lifting Eye, Lifting Loop LL, **Lifting Loop with pressure plate and Lifting Loop "Goliath"** (for more information, look at brochure "Threaded System Accessories" page 8-15) are to be used as lifting device of the Thread System. They must be completely screwed into the Concrete Anchors.





4. Fixing component

An element is attached to the Concrete Anchor with a standard metric thread fastening bolt and washer.



Concrete Anchor № 410

The Concrete Anchors are made for lifting and fastening of precast concrete products.

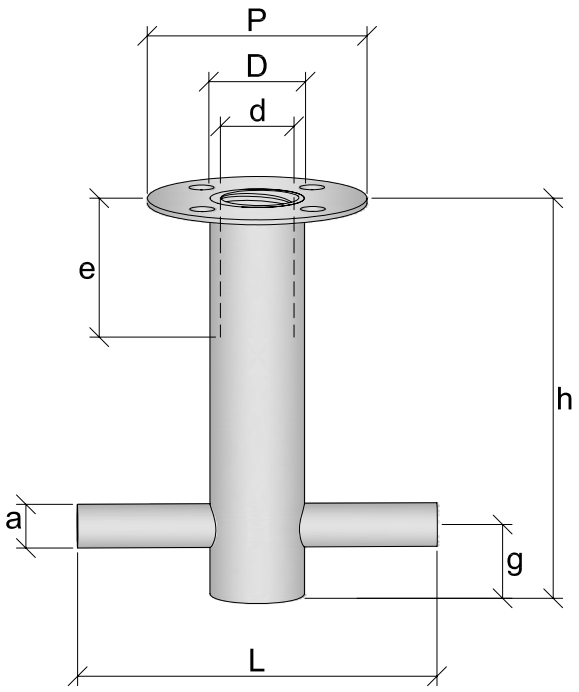
Concrete Anchors can be used in concrete C20/25 and the minimum necessary surface reinforcement.

Concrete Anchor with anchorage reinforcement is set into the concrete before the casting and serves a basis for Lifting Loops LL, Lifting Loops "Goliath", Lifting Loops with Pressure Plate and Lifting Eye.

There is the half-round metric thread Rd in the Concrete Anchor № 410, which should be greased before the installation into the precast concrete unit. The fastening details equipped with normal metric standard thread can be fastened to the thread.

Concrete Anchor № 410 has a nailing plate and can be simply and efficiently nailed to wooden formwork. To prevent dirt and concrete from penetrating into the thread of the socket, External Caps are used.

The cast-in concrete inserts are manufactured in accordance with the product declaration approved by the concrete Association of Finland, and the company has included a quality control contract with SFS-Inspecta Sertifiointi Oy.



Materials:

- steel S355, polished or
- zinc-plated or
- stainless steel A2

Table 1: Concrete Anchor № 410 with metric thread (steel S355, polished)

Article	Type	d [mm]	h [mm]	D [mm]	e [mm]	a [mm]	g [mm]	L [mm]	P [mm]
01001	M12×50	12	50	18	22	10	12	80	45
01002	M12×70	12	70	18	25	10	15	80	45
01003	M16×50	16	50	22	22	10	12	22	54
01004	M16×70	16	70	22	27	10	15	22	54
01005	M16×90	16	90	22	27	10	15	22	54
01006	M20×100	20	100	25	30	12	25	25	64
01007	M20×120	20	120	25	30	12	25	25	64

Table 2: Concrete Anchor № 410S with metric thread (zinc-plated)

Article	Type	d [mm]	h [mm]	D [mm]	e [mm]	a [mm]	g [mm]	L [mm]	P [mm]
01101	M12×50	12	50	18	22	10	12	80	45
01102	M12×70	12	70	18	25	10	15	80	45
01103	M16×50	16	50	22	22	10	12	22	54
01104	M16×70	16	70	22	27	10	15	22	54
01105	M16×90	16	90	22	27	10	15	22	54
01106	M20×100	20	100	25	30	12	25	25	64
01107	M20×120	20	120	25	30	12	25	25	64

Table 3: Concrete Anchor № 410R with metric thread (stainless steel)

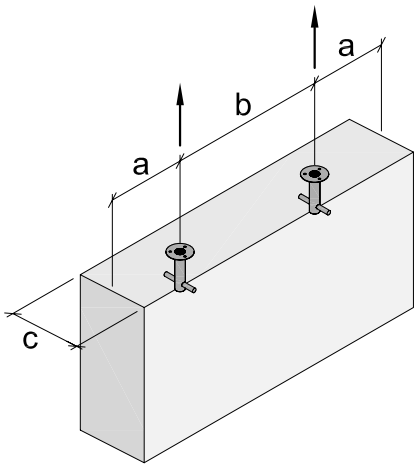
Article	Type	d [mm]	h [mm]	D [mm]	e [mm]	a [mm]	g [mm]	L [mm]	P [mm]
01201	M12×50	12	50	18	22	10	12	80	45
01202	M12×70	12	70	18	25	10	15	80	45
01203	M16×50	16	50	22	22	10	12	22	54
01204	M16×70	16	70	22	27	10	15	22	54
01205	M16×90	16	90	22	27	10	15	22	54
01206	M20×100	20	100	25	30	12	25	25	64
01207	M20×120	20	120	25	30	12	25	25	64

Installation Instructions for Concrete Anchors

1. Spacing of Concrete Anchors and edge distances

Table 4: Minimal dimensions

Type	a_{min} [mm]	b_{min} [mm]	c_{min} [mm]
M/Rd12×50	400	200	75
M/Rd12×70	400	200	105
M/Rd16×50	400	200	75
M/Rd16×70	400	200	105
M/Rd16×90	400	200	135
M/Rd20×100	400	200	150
M/Rd20×120	480	240	180



2. Permissible loads

Application as load transferring metal parts:

Table 5 lists the calculated values of cast-in concrete inserts' tensile and shearing capacities, when the inserts are being used as load transferring metal parts other than lifting anchors. The calculated loads of the cast-in concrete inserts (the nominal load, indicated by the partial safety factor) must be smaller than the calculated value of the tensile or shearing capacities.
The established calculated capacity values presume that the attached structural fastening devices (threaded pins and screws) are screwed in the entire length of the thread.

The calculated capacity values provided in Table 5 have been obtained by dividing the nominal capacity by the coefficient depending on the fracturing pattern of the fastening. Since the fracture was caused by fracturing of the concrete in the fastening base, the value 1.5 (reinforced structure) should be taken for the safety factor. Furthermore, in case of brittle fracture of the insert anchoring, the additional safety factor 1.2 is applied.

The fastening shall be designed so as to ensure that failure of the fastening of one of the cast-in inserts does not lead to a successive collapse, and thus the disconnection of the structural part or equipment being fastened. At least two cast-in concrete inserts fails the load applied to the remaining inserts must be lower than their double calculated capacity.

The calculated values of the tensile and shearing capacities of the load transferring cast-in concrete inserts for the concrete type C20/25. Not used for lifting of elements.
Reference: *The measured values of the tensile and shearing capacities of cast-in concrete inserts are provided in VTT survey report No (Cast-in concrete inserts M10-M20) and RTE3328/05 9.9.2005 (Lifting Anchors M24)*

Table 5: Cast-in concrete inserts

Type	Calculated tensile capacity value [kN]	Calculated shearing capacity value [kN]
M10×45	9.6	-
M10×60	11.5	-
M/Rd12×50	10.8	12.3
M/Rd12×70	18.9	19.8
M/Rd16×50	10.8	13.6
M/Rd16×70	19.9	19.8
M/Rd16×90	27.0	21.1
M/Rd20×100	30.9	37.3
M/Rd20×120	40.0	40.7
M/Rd24×120	39.4	45.2
M/Rd24×150	52.2	61.7

Application of cast-in concrete inserts for lifting anchors:

VTT research report No RTE3261/04 8.10.2004 for cast-in concrete insert types No 310, 310R, 310H, 410, 410R, 410H (sizes M / Rd12—M / Rd20), applying the concrete strength class C20/25, and **RTE 3328/05 9.9.2005** for lifting anchors No 310, 310R, 310H, 410, 410R, 410H (sizes M / Rd24)

Pursuant to the Finnish National Building Code (Rak MK), Part B4, clause 2.6.1.5, the load, which is at least four times the load caused by the element, shall be applied as the calculated load for a lifting anchor and its fastening. Table 6 presents the permissible vertical load of a cast-in concrete insert (element's permitted weight) with the lifting angle value of 0° (vertical lift) 30° and 60°. The lifting angle 90° represents the permissible shear force of a cast-in concrete insert. The lifting angle means the angle between the lifting cable and a vertical line.

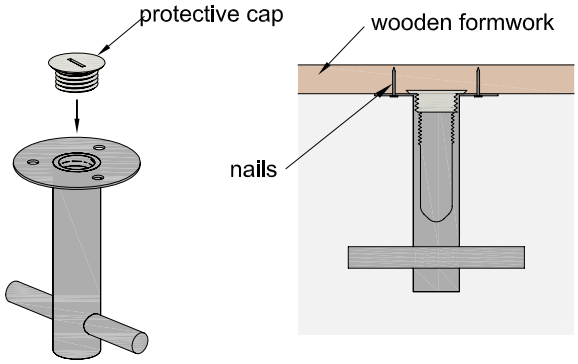
The permissible vertical load of a lifting anchor (permissible element weight) [kN] with the lifting angle values 0°, 30°, 60° and the permissible shear force of a cast-in concrete insert (lifting angle 90°) for reinforced concrete C20/25.
Reference: *The measured values of cast-in concrete inserts are provided in VTT survey report No (Cast-in concrete inserts M12-M20) and RTE3328/05 9.9.2005 (Lifting Anchors M24)*

Table 6: Lifting Anchors

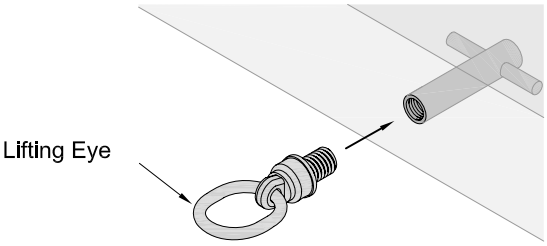
Type	Permissible vertical load (element weight) [kN]			
	Lifting angle:			
	0° (vertical lift)	30°	60°	90° (permissible shear force)
M10×45	4.9	3.9	2.3	5.6
M10×60	9.0	6.8	3.9	8.9
M/Rd12×50	4.9	4.0	2.5	6.2
M/Rd12×70	9.0	6.8	3.9	8.9
M/Rd16×50	12.6	8.6	4.6	9.5
M/Rd16×70	13.9	11.3	6.9	16.8
M/Rd16×90	18.0	13.8	8.0	18.4
M/Rd20×100	17.8	14.2	8.5	20.4
M/Rd20×120	23.5	18.9	11.4	27.8
M/Rd24×120	17.8	14.2	8.5	20.4
M/Rd24×150	23.5	18.9	11.4	27.8

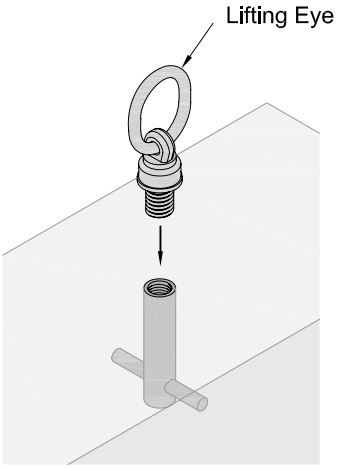
3. Accessories of Installation

Protective Caps (for more information, look at brochure “Threaded Lifting System”, page 6) are used to seal Concrete Anchor and prevent various substances such as residual concrete, dust, snow etc. from penetrating into the Concrete Anchor, protecting the anchor thread from clogging up.



Lifting Eye, Treaded Lifting Loop, **Threaded Lifting Loop with pressure plate and Lifting Loop “Goliath”** (for more information, look at brochure “Threaded System Accessories” page 8-15) are to be used as lifting devices of the Thread System. They must be completely screwed into the Concrete Anchors.





4. Fixing component

An element is attached to the Concrete Anchor with a standard metric thread fastening bolt and washer.