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CONCRETE SCREW-ANCHOR
HEX HEAD / ZINC PLATED / GALVANISED

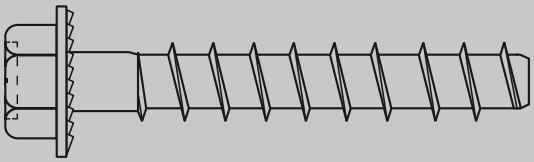
ZP GAL

CERTIFICATION | TDS

TECHNICAL DATA SHEET:

Design Made Easy

ETAG 001 - Annex C Design Tables



NCC Compliant AS 5216

Design tables in accordance with AS 5216 and ETAG 001- Annex C, essential for NCC compliance for safety critical applications.

The ETA document meets anchor testing and reporting requirements of AS 5216, essential for compliance with the NCC.

NCC COMPLIANT AS 5216

For Install Support
techadvice@allfasteners.com.au

For Specification Support
engineering@allfasteners.com.au

For Customer Support
1800 255 349

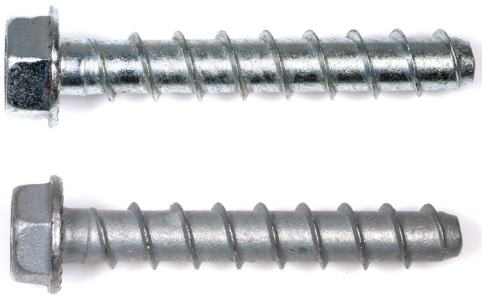
CONCRETE SCREW-ANCHOR

ZINC PLATED, GALVANISED / HEX HEAD

FEATURES & BENEFITS

- Fast and easy to install
- Close to edge installation and close spacings due to low expansion forces
- Removable
- Suitable for permanent or temporary structures
- Dual hardened carbon steel for high performance

ANCHOR



ZINC PLATED

GALVANISED

Certification:

ETA-18/0565
04 SEP 2018

AS 5216:2018

Fire

Cyclic Loading

Design Software:

Anchor Design Toolkit

AnchorFOS

Base Material:

Un-cracked Concrete

Cracked Concrete

Brick Masonry

Installation:

Hammer Drill

Close to edge

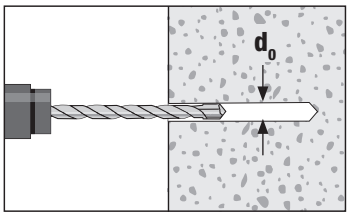
Overhead

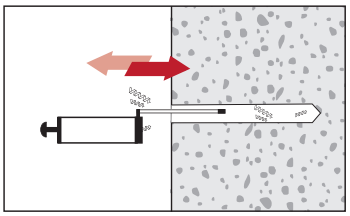
Removable

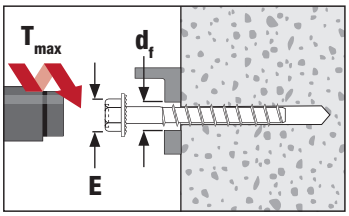
MATERIAL PROPERTIES

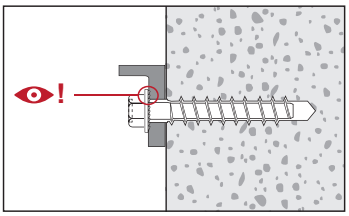
Anchor size (mm)	Steel tensile design capacity, $\phi N_{Rk,s}$ (kN)	Steel shear design capacity, $\phi V_{Rk,s}$ (kN)	Yield tensile strength, f_{yf} (MPa)	Ultimate tensile strength, f_{uf} (MPa)	Minimum zinc plating thickness (µm)	Minimum galvanising thickness (µm)	Steel tension capacity reduction factor, ϕ_{Ms}	Steel shear capacity reduction factor, ϕ_{Ms}	Concrete tension capacity reduction factor, ϕ_{Mc}	Concrete shear capacity reduction factor, ϕ_{Mc}
8	25.6	11.3	780	870	5	60	0.71	0.67	0.48	0.67
10	40.7	17.9	750	850	5	60	0.71	0.67	0.67	0.67
12	59.3	26.0	750	850	5	60	0.71	0.67	0.56	0.67

INSTALLATION









1. Drill the hole to the specified depth and diameter
2. Clean the hole
3. Screw in the anchor using a torque wrench or an impact screw driver to the corresponding torque value / setting / maximum power output. Ensure not to over-tighten.
4. Check to ensure that you have full contact of screw head with fixture.

CONCRETE SCREW-ANCHOR

ZINC PLATED, GALVANISED / HEX HEAD

INSTALLATION DETAILS

Anchor size (mm)	Diameter of drill bit, d_0 (mm)	Clearance hole in fixture, d_f (mm)	Minimum embedment depth, h_{nom} (mm)	Minimum hole depth in concrete, h_1 (mm)	Minimum member thickness, h_{min} (mm)	Absolute minimum edge distance, c_{min} (mm)	Absolute minimum anchor spacing, s_{min} (mm)	Maximum fixture thickness, t_{fix} (mm)	Maximum installation torque, T_{inst} (Nm) (torque wrench)	Max. power output, power tool setting, T_{max} (Nm)
8	8	11	65	75	110	50	50	35	40	185
10	10	13	75	85	130	60	60	75	60	350
12	12	15	95	105	160	70	70	55	80	350

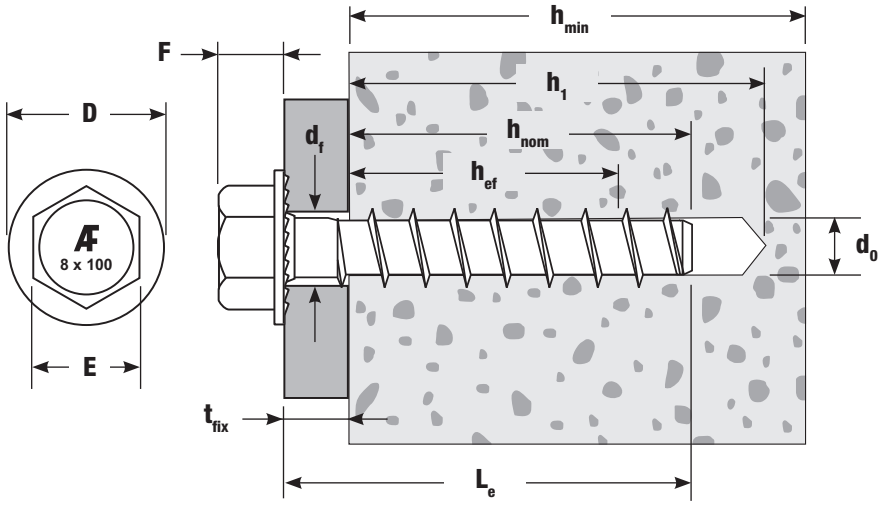
The minimum embedment depths are specified based on ETA values tested and are required for NCC compliance and design according to AS 5216. For non-safety critical applications, smaller embedment can be used.

DIMENSIONS AND PART NUMBERS

Anchor size (mm)	Description	Effective length, L_e (mm)	Maximum fixture thickness, t_{fix} (mm)	Part number		Flanged head height, F (mm)	Washer diameter, D (mm)	Wrench size, E (mm)
				Zinc plated	Galvanised			
8	8 x 75mm	75	10	1SAHZ08075	1SAHG08075	8	17	13
	8 x 100mm	100	35	1SAHZ08100	1SAHG08100	8	17	13
10	10 x 85mm	85	10	-	1SAHG10085	10	22	17
	10 x 100mm	100	25	1SAHZ10100	1SAHG10100	10	22	17
	10 x 120mm	120	45	1SAHZ10120	1SAHG10120	10	22	17
	10 x 150mm	150	75	-	1SAHG10150	10	22	17
12	12 x 100mm	100	5	1SAHZ12100	1SAHG12100	11.5	25	19
	12 x 150mm	150	55	1SAHZ12150	1SAHG12150	11.5	25	19

Check fixing length to ensure that you can achieve the minimum embedment depth (h_{nom}) with the fixture thickness (t_{fix}) used. Maximum t_{fix} that can be achieved are listed in the adjacent table.

$$h_{nom} = L_e - t_{fix}$$



Five Second Design Table –

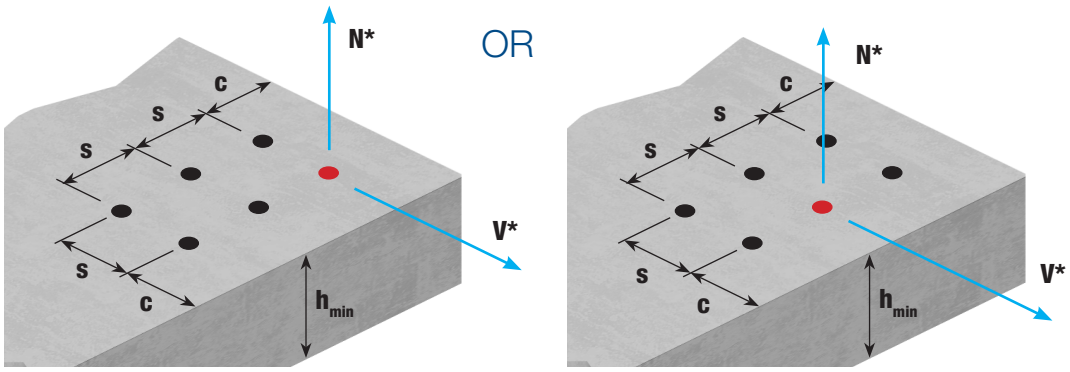
AS 5216 (SA TS 101) and ETAG 001 - Annex C

If you meet the parameters of the table below, your design can finish here!

Anchor size (mm)	Minimum member thickness, h_{min} (mm)	Minimum embedment depth, h_{nom} (mm)	CRACKED CONCRETE						UN-CRACKED CONCRETE					
			Minimum edge distance, **c** (mm)	Minimum anchor spacing, **s** (mm)	Tension design capacity, ϕN_{Rk} (kN) Concrete compressive strength, f'_c			Shear design capacity, ϕV_{Rk} (kN), for $f'_c \geq$ 32 MPa	Minimum edge distance, **c** (mm)	Minimum anchor spacing, **s** (mm)	Tension design capacity, ϕN_{Rk} (kN) Concrete compressive strength, f'_c			Shear design capacity, ϕV_{Rk} (kN), for $f'_c \geq$ 32 MPa
					20 MPa	32 MPa	50 MPa				20 MPa	32 MPa	50 MPa	
8	110	65	50	100	2.1	2.7	3.3	2.6	50	105	4.2	5.4	6.6	3.8
10	130	75	60	145	6.6	8.4	10.3	4.0	60	160	9.6	12.1	14.9	5.8
12	160	95	70	165	6.6	8.4	10.3	5.2	70	220	10.6	13.4	16.5	7.7

Design capacities **per fixing** with the influence of edge distances and adjacent anchor spacings are tabulated. Table conservatively applies to either of the two worst-case fixings shown.

Worst-case fixing: ●



NOTES

1. This table is optimised for getting maximum tensile capacity while maintaining the absolute minimum edge distance. Higher capacities can be achieved, especially for shear. Please refer to the simplified design tables on the following pages or use Allfasteners design software for more complex design cases. Design tables are developed using this software.
2. **AS 5216 (Cl. 3.3) requires all anchors to be designed in cracked concrete unless it can be shown that cracking (due to applied and intrinsic loads (e.g. shrinkage)) will not occur in concrete during service life.**
3. Increasing fixing embedment will not increase published capacity to AS 5216 because the ETA testing for this anchor is done on just one most optimal embedment depth.
4. Published capacities have been reduced, where necessary, to account for cyclic loading and crack width cycling. This is part of the ETA certification process. This covers static and quasi-static loading, for example wind.
5. It is assumed no dense reinforcement is present. Dense reinforcement can reduce tensile capacity. Dense reinforcement is not present if (a) spacing of bars of any diameter is ≥150mm, or (b) bars that are ≤10mm in diameter are spaced at ≥100mm apart.
6. It is assumed no edge reinforcement is present. Edge reinforcement can increase shear capacity.
7. Tables assume no cantilever effect (fixings not put into bending).
8. All anchors shall be installed strictly according to correct installation instructions and performance shall be checked on site to confirm adequate strength.

Simplified Design Tables –
AS 5216 (SA TS 101) and ETAG 001 - Annex C

NOTES

1. Design capacity **for the whole connection** (not per fixing) is shown.
2. AS 5216 assumes the base plate is rigid.
3. Linear interpolation is permitted within the limts of the tables.
4. The design tables are developed using Allfasteners design software. For more complex design cases, please use the software.
5. Notes 2. – 8. on previous page are also applicable to these design tables.

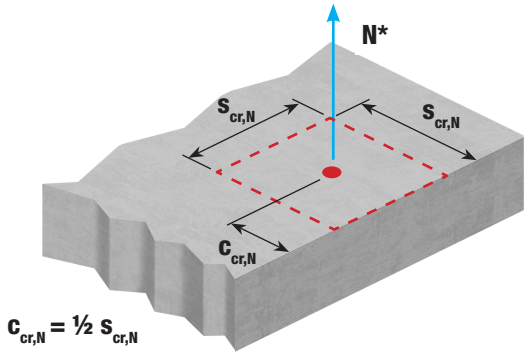
EMBEDMENT AND CONCRETE THICKNESS

Anchor size (mm)	Minimum member thickness, h_{min} (mm)	Minimum embedment depth, h_{nom} (mm)
8	110	65
10	130	75
12	160	95

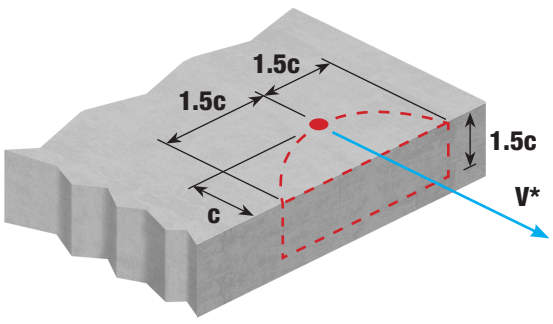
CONCRETE CONE SIZE

Use of concrete cone size information below is optional. It can help you determine and visualise the spacing and edge distance effects beyond those tabulated.

Anchor size (mm)	Characteristic spacing, $s_{cr,N}$ (mm)
8	152
10	174
12	226



TENSION CONE SIZE



SHEAR CONE SIZE

COMBINED ACTIONS

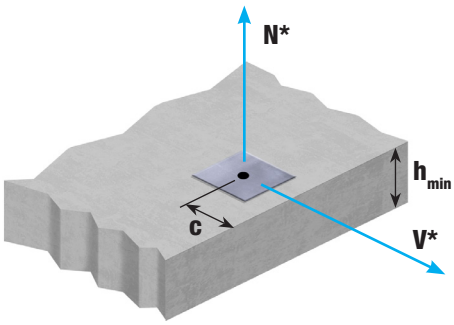
When tension and shear loading acts simultaneously, the following equation must be satisfied:

$$\frac{N^*}{\phi N_{Rk}} + \frac{V^*}{\phi V_{Rk}} \leq 1.2 \quad \text{where} \quad \frac{N^*}{\phi N_{Rk}} \leq 1 \quad \text{and} \quad \frac{V^*}{\phi V_{Rk}} \leq 1$$

CONCRETE SCREW-ANCHOR

ZINC PLATED, GALVANISED / HEX HEAD

SIMPLIFIED DESIGN – 1 ANCHOR PER BASE PLATE



Anchor size (mm)	Edge distance, c (mm)	CRACKED CONCRETE						UN-CRACKED CONCRETE					
		Tension design capacity, ϕN_{Rk} (kN)			Shear design capacity, ϕV_{Rk} (kN)			Tension design capacity, ϕN_{Rk} (kN)			Shear design capacity, ϕV_{Rk} (kN)		
		Concrete compressive strength, f'_c			Concrete compressive strength, f'_c			Concrete compressive strength, f'_c			Concrete compressive strength, f'_c		
		20 MPa	32 MPa	50 MPa	20 MPa	32 MPa	50 MPa	20 MPa	32 MPa	50 MPa	20 MPa	32 MPa	50 MPa
8	50	2.1	2.7	3.3	3.1	4.0	4.9	4.2	5.4	6.6	4.5	5.7	6.9
	60	2.1	2.7	3.3	4.0	5.1	6.3	4.2	5.4	6.6	5.7	7.2	8.9
	80	2.1	2.7	3.3	5.7	7.3	8.9	4.2	5.4	6.6	8.1	10.3	11.3
	130	2.1	2.7	3.3	8.6	10.9	11.3	4.2	5.4	6.6	11.3	11.3	11.3
10	60	6.6	8.4	10.3	4.3	5.4	6.7	10.6	13.4	16.5	6.1	7.7	9.4
	90	6.6	8.4	10.3	7.3	9.2	11.3	10.6	13.4	16.5	10.3	13.1	16.0
	120	6.6	8.4	10.3	9.4	11.9	14.6	10.6	13.4	16.5	13.3	16.8	17.9
	150	6.6	8.4	10.3	10.6	13.4	16.4	10.6	13.4	16.5	14.9	17.9	17.9
12	70	6.6	8.4	10.3	5.7	7.2	8.9	13.1	16.6	20.3	8.1	10.2	12.5
	110	6.6	8.4	10.3	10.3	13.0	16.0	13.8	17.5	21.5	14.5	18.4	22.5
	150	6.6	8.4	10.3	13.4	17.0	20.8	13.8	17.5	21.5	19.0	24.0	26.0
	320	6.6	8.4	10.3	26.0	26.0	26.0	13.8	17.5	21.5	26.0	26.0	26.0

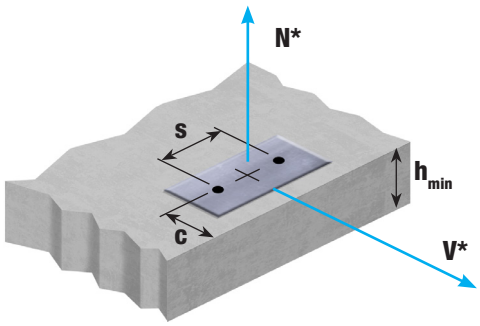
Failure Mode: (T)Tension (S) Shear

PULL-OUT (T)	CONCRETE CONE (T)	CONCRETE SPLITTING (T)	CONCRETE EDGE (S)	PRY-OUT (S)	STEEL (T OR S)

CONCRETE SCREW-ANCHOR

ZINC PLATED, GALVANISED / HEX HEAD

SIMPLIFIED DESIGN – 2 ANCHORS PER BASE PLATE



Anchor size (mm)	Edge distance, c (mm)	Spacing, s (mm)	CRACKED CONCRETE						UN-CRACKED CONCRETE					
			Tension design capacity, ϕN_{Rk} (kN)			Shear design capacity, ϕV_{Rk} (kN)			Tension design capacity, ϕN_{Rk} (kN)			Shear design capacity, ϕV_{Rk} (kN)		
			Concrete compressive strength, f'_c			Concrete compressive strength, f'_c			Concrete compressive strength, f'_c			Concrete compressive strength, f'_c		
			20 MPa	32 MPa	50 MPa	20 MPa	32 MPa	50 MPa	20 MPa	32 MPa	50 MPa	20 MPa	32 MPa	50 MPa
8	50	50	4.2	5.4	6.6	4.2	5.3	6.5	8.5	10.8	13.2	6.0	7.6	9.3
		70	4.2	5.4	6.6	4.6	5.9	7.2	8.5	10.8	13.2	6.6	8.3	10.2
		100	4.2	5.4	6.6	5.3	6.7	8.2	8.5	10.8	13.2	7.5	9.5	11.6
		150	4.2	5.4	6.6	6.3	8.0	9.8	8.5	10.8	13.2	9.0	11.4	13.9
	70	50	4.2	5.4	6.6	6.2	7.8	9.6	8.5	10.8	13.2	8.8	11.1	13.6
		100	4.2	5.4	6.6	7.4	9.4	11.5	8.5	10.8	13.2	10.5	13.2	16.2
		150	4.2	5.4	6.6	8.5	10.9	13.3	8.5	10.8	13.2	12.2	15.4	18.0
		250	4.2	5.4	6.6	10.0	12.7	15.6	8.5	10.8	13.2	14.2	18.0	18.0
	100	50	4.2	5.4	6.6	8.2	10.4	12.7	8.5	10.8	13.2	11.6	14.6	17.9
		100	4.2	5.4	6.6	9.3	11.8	14.5	8.5	10.8	13.2	13.2	16.7	18.0
		150	4.2	5.4	6.6	10.5	13.3	16.3	8.5	10.8	13.2	14.9	18.0	18.0
		300	4.2	5.4	6.6	14.1	17.8	18.0	8.5	10.8	13.2	18.0	18.0	18.0
	180	50	4.2	5.4	6.6	11.5	14.5	17.8	8.5	10.8	13.2	16.1	18.0	18.0
		100	4.2	5.4	6.6	14.1	17.8	18.0	8.5	10.8	13.2	18.0	18.0	18.0
		150	4.2	5.4	6.6	15.2	18.0	18.0	8.5	10.8	13.2	18.0	18.0	18.0
		240	4.2	5.4	6.6	17.2	18.0	18.0	8.5	10.8	13.2	18.0	18.0	18.0
10	60	60	10.9	13.8	16.9	5.7	7.3	8.9	15.3	19.4	23.7	8.1	10.3	12.6
		90	12.3	15.6	19.1	6.5	8.2	10.0	17.3	21.8	26.8	9.1	11.6	14.2
		120	13.3	16.8	20.6	7.2	9.1	11.1	19.2	24.3	24.3	10.2	12.9	15.8
		180	13.3	16.8	20.6	8.6	10.9	13.4	21.3	26.8	33.0	12.2	15.4	18.9
	90	60	13.3	16.8	20.6	8.9	11.3	13.9	20.0	25.4	31.1	12.6	16.0	19.6
		90	13.3	16.8	20.6	9.7	12.3	15.1	21.3	26.8	33.0	13.8	17.4	21.4
		150	13.3	16.8	20.6	11.4	14.4	17.7	21.3	26.8	33.0	16.1	20.4	25.0
		270	13.3	16.8	20.6	14.4	18.4	22.7	21.3	26.8	33.0	20.7	26.2	28.6
	120	60	13.3	16.8	20.6	11.0	13.9	17.0	20.0	25.4	31.1	15.5	19.6	24.0
		150	13.3	16.8	20.6	13.3	16.8	20.6	21.3	26.8	33.0	18.8	23.8	28.6
		250	13.3	16.8	20.6	15.9	20.2	24.7	21.3	26.8	33.0	22.5	28.5	28.6
		360	13.3	16.8	20.6	18.8	23.8	28.6	21.3	26.8	33.0	26.6	28.6	28.6
	240	60	13.3	16.8	20.6	14.3	18.1	22.1	20.0	25.4	31.1	20.0	25.4	28.6
		90	13.3	16.8	20.6	16.1	20.4	25.0	21.3	26.8	33.0	22.6	28.6	28.6
		120	13.3	16.8	20.6	17.9	22.7	27.8	21.3	26.8	33.0	25.2	28.6	28.6
		180	13.3	16.8	20.6	21.2	26.8	28.6	21.3	26.8	33.0	28.6	28.6	28.6

Continued over page...

Failure Mode: (T)Tension (S) Shear

PULL-OUT (T)	CONCRETE CONE (T)	CONCRETE SPLITTING (T)	CONCRETE EDGE (S)	PRY-OUT (S)	STEEL (T OR S)

Continued.... SIMPLIFIED DESIGN – 2 ANCHORS PER BASE PLATE

Anchor size (mm)	Edge distance, c (mm)	Spacing, s (mm)	CRACKED CONCRETE						UN-CRACKED CONCRETE					
			Tension design capacity, ϕN_{Rk} (kN)			Shear design capacity, ϕV_{Rk} (kN)			Tension design capacity, ϕN_{Rk} (kN)			Shear design capacity, ϕV_{Rk} (kN)		
			Concrete compressive strength, f'_c			Concrete compressive strength, f'_c			Concrete compressive strength, f'_c			Concrete compressive strength, f'_c		
			20 MPa	32 MPa	50 MPa	20 MPa	32 MPa	50 MPa	20 MPa	32 MPa	50 MPa	20 MPa	32 MPa	50 MPa
12	70	70	12.2	15.5	19.0	7.6	9.7	11.8	17.2	21.8	26.6	10.8	13.6	16.7
		100	13.3	16.8	20.6	8.4	10.6	13.1	18.9	24.0	29.4	11.9	15.1	18.5
		150	13.3	16.8	20.6	9.8	12.4	15.2	21.8	27.6	33.9	13.9	17.6	21.5
		230	13.3	16.8	20.6	11.4	14.4	17.8	26.2	33.2	40.6	16.2	20.5	25.0
	100	70	13.3	16.8	20.6	11.3	14.4	17.6	21.8	27.6	33.8	16.0	20.3	24.9
		100	13.3	16.8	20.6	12.3	15.5	19.0	24.0	30.4	37.2	17.3	21.9	26.9
		150	13.3	16.8	20.6	13.8	17.5	21.4	27.7	35.0	43.0	19.5	24.7	30.3
		300	13.3	16.8	20.6	18.4	23.3	28.6	27.7	35.0	43.0	26.0	32.9	40.4
	150	70	13.3	16.8	20.6	15.5	19.6	24.1	24.0	30.3	37.2	21.9	27.8	34.0
		100	13.3	16.8	20.6	16.4	20.8	25.5	26.4	33.4	40.9	23.2	29.4	36.0
		150	13.3	16.8	20.6	17.9	22.7	27.8	27.7	35.0	43.0	25.3	32.0	39.2
		450	13.3	16.8	20.6	26.9	34.0	41.6	27.7	35.0	43.0	38.0	41.6	41.6
	340	70	13.3	16.8	20.6	29.6	37.4	41.6	24.0	30.3	37.2	41.6	41.6	41.6
		100	13.3	16.8	20.6	30.4	38.5	41.6	26.4	33.4	40.9	41.6	41.6	41.6
		150	13.3	16.8	20.6	31.8	40.2	41.6	27.7	35.0	43.0	41.6	41.6	41.6
		510	13.3	16.8	20.6	41.6	41.6	41.6	27.7	35.0	43.0	41.6	41.6	41.6

Failure Mode: (T)Tension (S) Shear

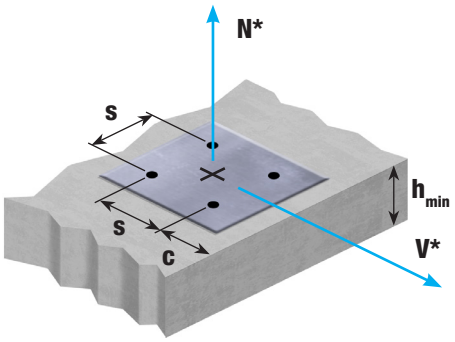
PULL-OUT (T)	CONCRETE CONE (T)	CONCRETE SPLITTING (T)	CONCRETE EDGE (S)	PRY-OUT (S)	STEEL (T OR S)

CONCRETE SCREW-ANCHOR

ZINC PLATED, GALVANISED / HEX HEAD

SIMPLIFIED DESIGN – 4 ANCHORS PER BASE PLATE

Note: Shear capacity calculation assumes that hole clearance between base plate and anchor is not filled with epoxy (standard construction practice). This can lead to unequal load distribution between fixings. To account for this, since concrete failure can be brittle, only the two anchors closest to concrete edge are assumed to provide shear capacity for concrete edge shear failure mode.



Anchor size (mm)	Edge distance, c (mm)	Spacing, s (mm)	CRACKED CONCRETE						UN-CRACKED CONCRETE					
			Tension design capacity, ϕN_{Rk} (kN)			Shear design capacity, ϕV_{Rk} (kN)			Tension design capacity, ϕN_{Rk} (kN)			Shear design capacity, ϕV_{Rk} (kN)		
			Concrete compressive strength, f'_c			Concrete compressive strength, f'_c			Concrete compressive strength, f'_c			Concrete compressive strength, f'_c		
			20 MPa	32 MPa	50 MPa	20 MPa	32 MPa	50 MPa	20 MPa	32 MPa	50 MPa	20 MPa	32 MPa	50 MPa
8	50	50	8.5	10.8	13.2	4.2	5.3	6.5	11.9	15.1	18.5	6.0	7.6	9.3
		70	8.5	10.8	13.2	4.6	5.9	7.2	14.6	18.5	22.7	6.6	8.3	10.2
		100	8.5	10.8	13.2	5.3	6.7	8.2	17.1	21.6	26.5	7.5	9.5	11.6
		150	8.5	10.8	13.2	6.3	8.0	9.8	17.1	21.6	26.5	9.0	11.4	13.9
	70	50	8.5	10.8	13.2	6.2	7.8	9.6	14.5	18.3	22.5	8.8	11.1	13.6
		100	8.5	10.8	13.2	7.4	9.4	11.5	17.1	21.6	26.5	10.5	13.2	16.2
		150	8.5	10.8	13.2	8.5	10.9	13.3	17.1	21.6	26.5	12.2	15.4	18.0
		250	8.5	10.8	13.2	10.0	12.7	15.6	17.1	21.6	26.5	14.2	18.0	18.0
	100	50	8.5	10.8	13.2	8.2	10.4	12.7	15.3	19.3	23.7	11.6	14.6	17.9
		100	8.5	10.8	13.2	9.3	11.8	14.5	17.1	21.6	26.5	13.2	16.7	18.0
		150	8.5	10.8	13.2	10.5	13.3	16.3	17.1	21.6	26.5	14.9	18.0	18.0
		300	8.5	10.8	13.2	14.1	17.8	18.0	17.1	21.6	26.5	18.0	18.0	18.0
	180	50	8.5	10.8	13.2	13.0	16.4	18.0	15.3	19.3	23.7	18.0	18.0	18.0
		100	8.5	10.8	13.2	14.1	17.8	18.0	17.1	21.6	26.5	18.0	18.0	18.0
		150	8.5	10.8	13.2	15.2	18.0	18.0	17.1	21.6	26.5	18.0	18.0	18.0
		280	8.5	10.8	13.2	18.0	18.0	18.0	17.1	21.6	26.5	18.0	18.0	18.0
10	60	60	15.4	19.4	23.8	5.7	7.3	8.9	21.6	27.3	33.4	8.1	10.3	12.6
		90	19.8	25.1	30.8	6.5	8.2	10.0	27.8	35.2	43.2	9.1	11.6	14.2
		120	24.9	31.5	38.6	7.2	9.1	11.1	35.0	44.2	54.2	10.2	12.9	15.8
		180	26.6	33.6	41.3	8.6	10.9	13.4	42.6	53.6	66.1	12.2	15.4	18.9
	90	60	19.2	24.3	29.8	8.9	11.3	13.9	27.0	34.1	41.8	12.6	16.0	19.6
		90	24.4	30.9	37.9	9.7	12.3	15.1	34.3	43.4	53.2	13.8	17.4	21.4
		150	26.6	33.6	41.3	11.4	14.4	17.7	42.6	53.6	66.1	16.1	20.4	25.0
		270	26.6	33.6	41.3	14.4	18.4	22.7	42.6	53.6	66.1	20.7	26.2	28.6
	120	60	19.2	24.3	29.8	11.0	13.9	17.0	27.0	34.1	41.8	15.5	19.6	24.0
		150	26.6	33.6	41.3	13.3	16.8	20.6	42.6	53.6	66.1	18.8	23.8	28.6
		250	26.6	33.6	41.3	15.9	20.2	24.7	42.6	53.6	66.1	22.5	28.5	28.6
		360	26.6	33.6	41.3	18.8	23.8	28.6	42.6	53.6	66.1	26.6	28.6	28.6
	240	60	19.2	24.3	29.8	18.9	23.9	28.6	27.0	34.1	41.8	26.5	28.6	28.6
		90	24.4	30.9	37.9	19.6	24.8	28.6	34.3	43.4	53.2	27.7	28.6	28.6
		120	26.6	33.6	41.3	20.3	25.7	28.6	42.6	53.6	66.1	28.6	28.6	28.6
		460	26.6	33.6	41.3	28.6	28.6	28.6	42.6	53.6	66.1	28.6	28.6	28.6

Failure Mode: (T)Tension (S) Shear

Continued over page...

PULL-OUT (T) | CONCRETE CONE (T) | CONCRETE SPLITTING (T) | CONCRETE EDGE (S) | PRY-OUT (S) | STEEL (T OR S)

Continued.... SIMPLIFIED DESIGN – 4 ANCHORS PER BASE PLATE

Anchor size (mm)	Edge distance, **c** (mm)	Spacing, **s** (mm)	CRACKED CONCRETE						UN-CRACKED CONCRETE					
			Tension design capacity, ϕN_{Rk} (kN)			Shear design capacity, ϕV_{Rk} (kN)			Tension design capacity, ϕN_{Rk} (kN)			Shear design capacity, ϕV_{Rk} (kN)		
			Concrete compressive strength, f'_c			Concrete compressive strength, f'_c			Concrete compressive strength, f'_c			Concrete compressive strength, f'_c		
			20 MPa	32 MPa	50 MPa	20 MPa	32 MPa	50 MPa	20 MPa	32 MPa	50 MPa	20 MPa	32 MPa	50 MPa
12	70	70	16.9	21.4	26.3	7.6	9.7	11.8	23.8	30.1	36.9	10.8	13.6	16.7
		100	20.9	26.4	32.4	8.4	10.6	13.1	29.3	37.1	45.4	11.9	15.1	18.5
		150	26.6	33.6	41.3	9.8	12.4	15.2	39.8	50.4	61.7	13.9	17.6	21.5
		230	26.6	33.6	41.3	11.4	14.4	17.8	52.6	66.5	81.5	16.2	20.5	25.0
	100	70	20.7	26.1	32.0	11.3	14.4	17.6	29.0	36.7	44.9	16.0	20.3	24.9
		100	25.2	31.8	39.0	12.3	15.5	19.0	35.3	44.7	54.8	17.3	21.9	26.9
		150	26.6	33.6	41.3	13.8	17.5	21.4	47.3	59.8	73.3	19.5	24.7	30.3
		300	26.6	33.6	41.3	18.4	23.3	28.6	55.5	70.0	86.1	26.0	32.9	40.4
	150	70	22.4	28.3	34.7	15.5	19.6	24.1	31.4	39.8	48.7	21.9	27.8	34.0
		100	26.6	33.4	41.3	16.4	20.8	25.5	38.1	48.2	59.1	23.2	29.4	36.0
		150	26.6	33.4	41.3	17.9	22.7	27.8	50.7	64.2	78.6	25.3	32.0	39.2
		450	26.6	33.4	41.3	26.9	34.0	41.6	55.5	70.0	86.1	38.0	41.6	41.6
	340	70	22.4	28.3	34.7	29.6	37.4	41.6	31.4	39.8	48.7	41.6	41.6	41.6
		100	26.6	33.4	41.3	30.4	38.5	41.6	38.1	48.2	59.1	41.6	41.6	41.6
		150	26.6	33.4	41.3	31.8	40.2	41.6	50.7	64.2	78.6	41.6	41.6	41.6
		510	26.6	33.4	41.3	41.6	41.6	41.6	55.5	70.0	86.1	41.6	41.6	41.6

Failure Mode: (T)Tension (S) Shear

PULL-OUT (T)	CONCRETE CONE (T)	CONCRETE SPLITTING (T)	CONCRETE EDGE (S)	PRY-OUT (S)	STEEL (T OR S)

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