ALLFASTENERS .COM.AU

CONCRETE SCREW ANCHOR

BUTTON HEAD / 316 (A4) STAINLESS STEEL

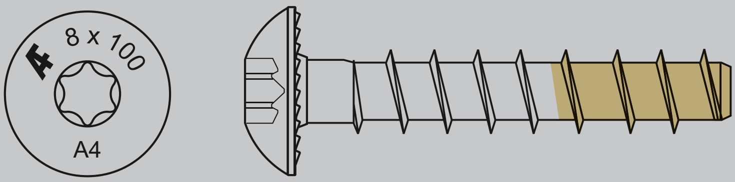
316

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

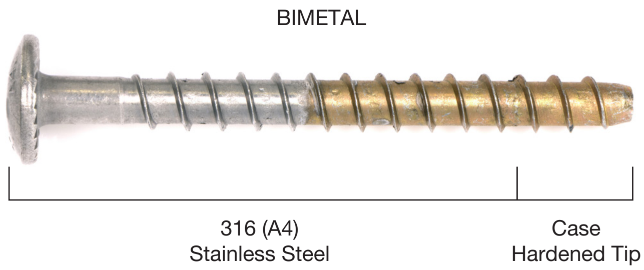
CONCRETE SCREW-ANCHOR

316 (A4) STAINLESS STEEL / BUTTON 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
- Superior Stainless Steel corrosion resistance
- The tip of anchor is made from hardened alloy and is conservatively assumed to be sacrificial for capacity calculation purposes

ANCHOR



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

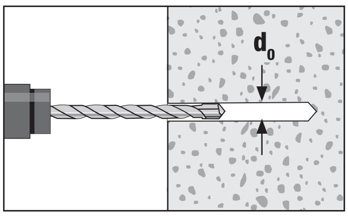
Installation:

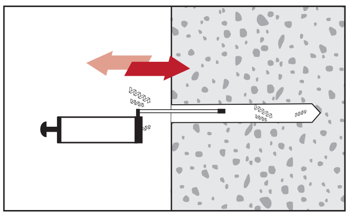
Hammer Drill · Close to edge · Overhead · Removable

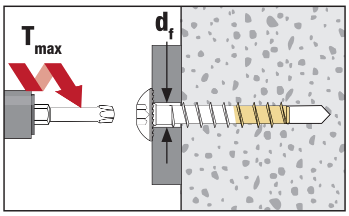
MATERIAL PROPERTIES

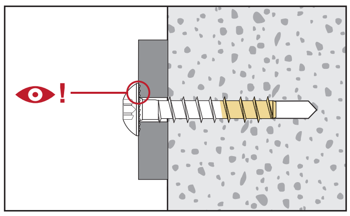
Anchor size (mm)	Steel tensile design capacity, $\phi N_{Rk,s}$ (kN)	Steel shear design capacity, $\phi V_{Rk,s}$ (kN)	Yield tensile strength, f_{yf} (MPa)	Ultimate tensile strength, f_{uf} (MPa)	Steel tension capacity reduction factor, ϕ_{Ms}	Steel shear capacity reduction factor, ϕ_{Ms}	Concrete tension capacity reduction factor, ϕ_{Mc}	Concrete shear capacity reduction factor, ϕ_{Mc}
8	14.9	9.0	432	540	0.67	0.8	0.48	0.67

INSTALLATION









1. Drill the hole to the specified depth and diameter
2. Clean the hole
3. Screw in the anchor using 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.

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)	Max. power output, power tool setting, T_{max} (Nm)
8	8	11	85	95	125	50	50	15	120

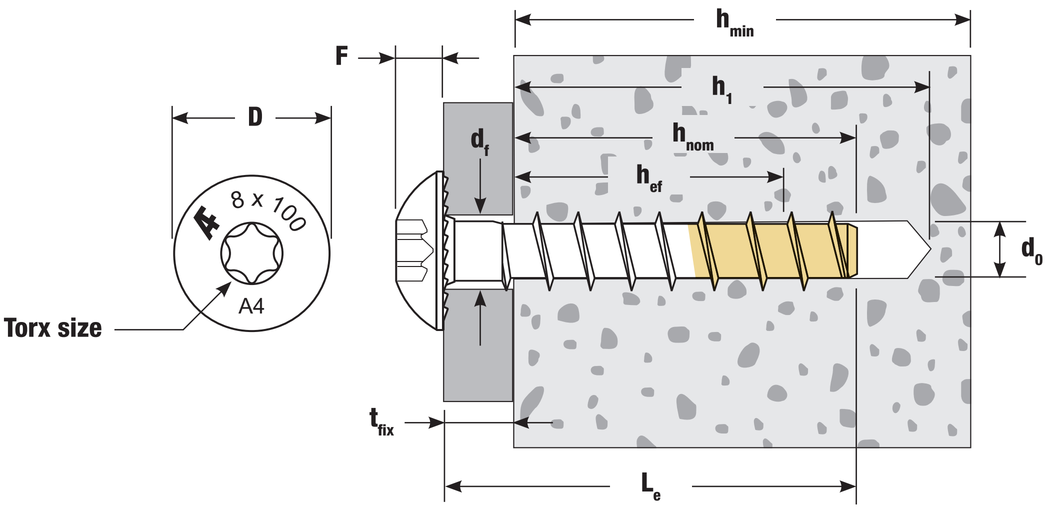
The minimum embedment depths are specified based on ETA values tested and are required for NCC compliance and design according to AS 5216. For non-safety critical applications, smaller embedment can be used.

DIMENSIONS AND PART NUMBERS

Anchor size (mm)	Description	Effective length, L_e (mm)	Maximum fixture thickness, t_{fix} (mm)	Part number	Head height, F (mm)	Head diameter, D (mm)	Torx Size
8	8 x 100mm	100	15	1SABS08100	5.2	21.9	45

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 –

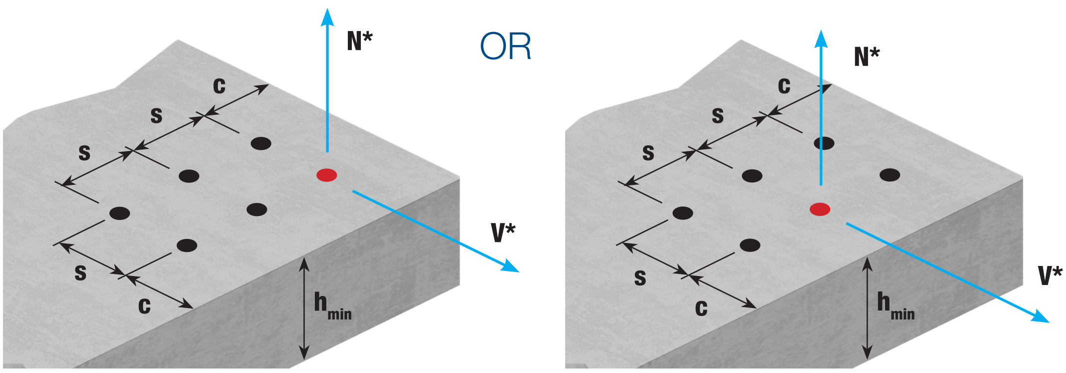
AS 5216 (SA TS 101) and ETAG 001 - Annex C

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	125	85	50	100	1.9	2.4	2.9	2.6	50	100	1.9	2.4	2.9	3.7

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.

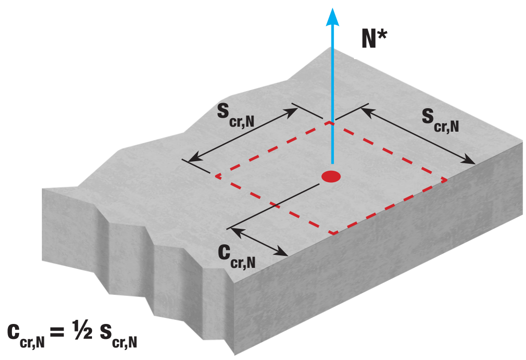
EMBEDMENT AND CONCRETE THICKNESS

Anchor size (mm)	Minimum member thickness, h_{min} (mm)	Minimum embedment depth, h_{nom} (mm)
8	125	85

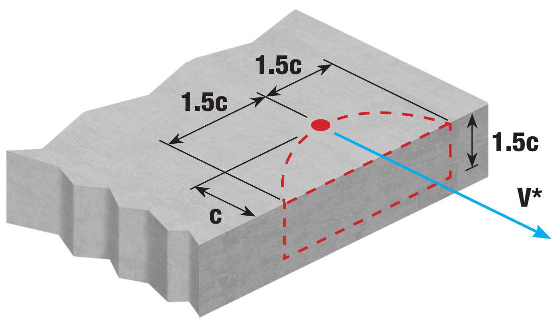
CONCRETE CONE SIZE

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	156



TENSION CONE SIZE



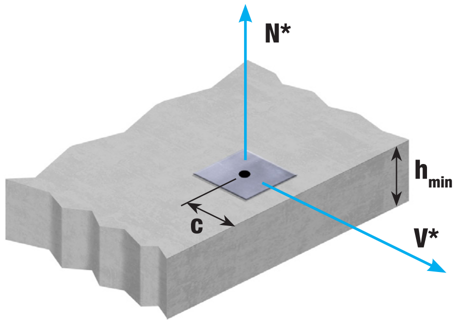
SHEAR CONE SIZE

COMBINED ACTIONS

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

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

SIMPLIFIED DESIGN – 1 ANCHOR PER BASE PLATE

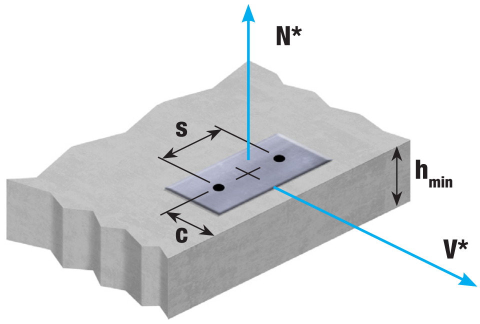


Anchor size (mm)	Edge distance, c (mm)	CRACKED CONCRETE						UN-CRACKED CONCRETE					
		Tension design capacity, ϕN_{Rk} (kN)			Shear design capacity, ϕV_{Rk} (kN)			Tension design capacity, ϕN_{Rk} (kN)			Shear design capacity, ϕV_{Rk} (kN)		
		Concrete compressive strength, f'_c			Concrete compressive 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	1.9	2.4	2.9	3.1	4.0	4.9	1.9	2.4	2.9	4.5	5.7	7.0
	60	1.9	2.4	2.9	4.1	5.1	6.3	1.9	2.4	2.9	5.7	7.2	8.9
	80	1.9	2.4	2.9	6.0	7.6	8.4	1.9	2.4	2.9	8.5	9.0	9.0
	125	1.9	2.4	2.9	8.9	9.0	9.0	1.9	2.4	2.9	9.0	9.0	9.0

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)

SIMPLIFIED DESIGN – 2 ANCHORS PER BASE PLATE



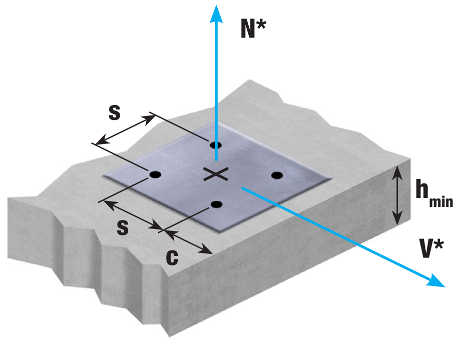
Anchor size (mm)	Edge distance, **c** (mm)	Spacing, **s** (mm)	CRACKED CONCRETE						UN-CRACKED CONCRETE					
			Tension design capacity, ϕN_{Rk} (kN)			Shear design capacity, ϕV_{Rk} (kN)			Tension design capacity, ϕN_{Rk} (kN)			Shear design capacity, ϕV_{Rk} (kN)		
			Concrete compressive strength, 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	3.8	4.8	5.9	4.2	5.3	6.6	3.8	4.8	5.9	6.0	7.6	9.3
		70	3.8	4.8	5.9	4.6	5.9	7.2	3.8	4.8	5.9	6.6	8.3	10.2
		100	3.8	4.8	5.9	5.3	6.7	8.2	3.8	4.8	5.9	7.5	9.5	11.6
		150	3.8	4.8	5.9	6.4	8.1	9.9	3.8	4.8	5.9	9.0	11.4	14.0
	70	50	3.8	4.8	5.9	6.2	7.9	9.7	3.8	4.8	5.9	8.8	11.1	13.7
		100	3.8	4.8	5.9	7.4	9.4	11.5	3.8	4.8	5.9	10.5	13.3	14.3
		150	3.8	4.8	5.9	8.6	10.9	13.3	3.8	4.8	5.9	12.2	14.3	14.3
		250	3.8	4.8	5.9	10.1	12.8	14.3	3.8	4.8	5.9	14.2	14.3	14.3
	100	50	3.8	4.8	5.9	8.7	11.1	13.6	3.8	4.8	5.9	11.6	14.3	14.3
		100	3.8	4.8	5.9	10.1	12.7	14.3	3.8	4.8	5.9	14.1	14.3	14.3
		150	3.8	4.8	5.9	11.3	14.3	14.3	3.8	4.8	5.9	14.3	14.3	14.3
		300	3.8	4.8	5.9	14.3	14.3	14.3	3.8	4.8	5.9	14.3	14.3	14.3
	180	50	3.8	4.8	5.9	11.8	14.3	14.3	3.8	4.8	5.9	14.3	14.3	14.3
		100	3.8	4.8	5.9	14.3	14.3	14.3	3.8	4.8	5.9	14.3	14.3	14.3
		150	3.8	4.8	5.9	14.3	14.3	14.3	3.8	4.8	5.9	14.3	14.3	14.3
		240	3.8	4.8	5.9	14.3	14.3	14.3	3.8	4.8	5.9	14.3	14.3	14.3

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)

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	7.6	9.6	11.8	4.2	5.3	6.6	7.6	9.6	11.8	6.0	7.6	9.3
		70	7.6	9.6	11.8	4.6	5.9	7.2	7.6	9.6	11.8	6.6	8.3	10.2
		100	7.6	9.6	11.8	5.3	6.7	8.2	7.6	9.6	11.8	7.5	9.5	11.6
		150	7.6	9.6	11.8	6.4	8.1	9.9	7.6	9.6	11.8	9.0	11.4	14.0
	70	50	7.6	9.6	11.8	6.2	7.9	9.7	7.6	9.6	11.8	8.8	11.1	13.7
		100	7.6	9.6	11.8	7.4	9.4	11.5	7.6	9.6	11.8	10.5	13.3	14.3
		150	7.6	9.6	11.8	8.6	10.9	13.3	7.6	9.6	11.8	12.2	14.3	14.3
		250	7.6	9.6	11.8	10.1	12.8	14.3	7.6	9.6	11.8	14.2	14.3	14.3
	100	50	7.6	9.6	11.8	8.7	11.1	13.6	7.6	9.6	11.8	11.6	14.3	14.3
		100	7.6	9.6	11.8	10.1	12.7	14.3	7.6	9.6	11.8	14.1	14.3	14.3
		150	7.6	9.6	11.8	11.3	14.3	14.3	7.6	9.6	11.8	14.3	14.3	14.3
		300	7.6	9.6	11.8	14.3	14.3	14.3	7.6	9.6	11.8	14.3	14.3	14.3
	180	50	7.6	9.6	11.8	13.9	14.3	14.3	7.6	9.6	11.8	14.3	14.3	14.3
		100	7.6	9.6	11.8	14.3	14.3	14.3	7.6	9.6	11.8	14.3	14.3	14.3
		150	7.6	9.6	11.8	14.3	14.3	14.3	7.6	9.6	11.8	14.3	14.3	14.3
		280	7.6	9.6	11.8	14.3	14.3	14.3	7.6	9.6	11.8	14.3	14.3	14.3

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)

Allfasteners® Engineering Department

78 - 84 Logistics Street Keilor Park VIC 3042 Australia +61 3 9330 0555