AnkaScrew™ Xtrem™

FIRE RATED MECHANICAL ANCHOR

GENERAL INFORMATION

Performance Related	Material	Installation Related
	Zn	

Product

A seismic certified heavy duty screw-in anchor for permanent anchoring into concrete. Certified for seismic C1 & C2 applications.

XTREM PREMIUM ANCHORING · FIRE TESTED · SEISMIC · 50 YEAR WORKING LIFE · ETA · CRACKED CONCRETE CERTIFIED

Compliance

European Technical Assessment (option1) - ETA-20/0731

Design According to:

- AS5216 (formerly TS101)
- AS1170.4 - Earthquake Actions
- EN1992-4 (formerly ETAG001 Annex C, E & TR045
- NZS3101 (A3) Section 17 - Seismic Design C1 & C2

Benefits, Advantages and Features

Fire tested to TR020

- Fire rated performance up to 120 minutes
- Highest level of European assessment for mechanical screw-in anchors
- Approved for all directions (floor, wall, overhead)
- Maximum Tensile & Shear capacities in cracked concrete
- Zinc Plating 5μm
- Anchor diameters 6mm to 12mm

Fast and easy to use:

- Install, simply screws into hole.
- Remove, leaving an empty hole.

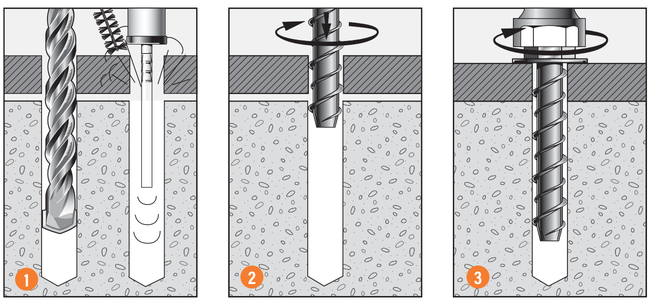
Close to edge and for close anchor spacing:

- Does not expand and burst concrete.

Principal Applications

- **Anchoring into cracked & non cracked concrete**
- **Steel framing**
- **Mechanical services**
- **Pallet racking**
- **Safety barriers**
- **Conveyors**
- **Hand rails**
- **Bottom plates**

Installation



1. Drill hole to correct diameter and depth. Important: Use **Ramset™ Dustless Drilling System** to ensure holes are clean. Alternatively, clean thoroughly with brush and remove debris by way of vacuum or hand pump, compressed air etc.
2. Using a socket wrench, screw the AnkaScrew™ Xtrem™ into the hole using slight pressure until the self tapping action starts.
3. Tighten the AnkaScrew™ Xtrem™ until flush with fixture.
   If resistance is experienced when tightening, unscrew anchor one turn and re-tighten. Ensure not to over tighten. Refer to tightening torque for limitations.

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Installation details for fire performance

Anchor size, d_b (mm)	Drilled hole diameter, d_h (mm)	Fixture hole diameter, d_f (mm)	Anchor effective depth, h (mm)	Depth of drill hole, h_1 (mm)	Tightening torque, T_r (Nm)	Concrete substrate thickness, b_m (mm) ***	Optimum dimensions	
							Anchor* spacing, a_c (mm)	Edge** distance, e_c (mm)
6	6	8	44	60	10	90	176	88
8	8	12	52	75	20	105	208	104
10	10	14	68	95	40	136	272	136
12	12	16	80	110	60	160	320	160

* For anchor spacings less than the optimum, please contact your local Ramset Engineer.

** If the fire attack is from more than one side,the edge distance of the anchor has to be ≥ 300mm and ≥ 2xh.

***Note: For performance based on smaller concrete substrate thickness, refer to iExpert Anchor Software or Ramset™ Engineer.

DESCRIPTION AND PART NUMBERS

Anchor size, d_b (mm)	Drilled hole diameter, d_h (mm)	Effective Length , L_e (mm)	Maximum Fixture Thickness, $t_{fix,max}$ (mm)	AnkaScrew™ Xtrem™ Description	Part Number
6	6	71	19	6mmx80mm zinc	AS06080X
8	8	67	15	8mmx80mm zinc	AS08080X
10	10	88	20	10mmx100mm zinc	AS10100X
12	12	95	15	12mmx110mm zinc	AS12110X
		135	55	12mmx150mm zinc	AS12150X

Effective depth, h (mm)

$$h = L_e - t$$

t = total thickness of material(s) being fixed

ENGINEERING PROPERTIES

Anchor size, d_b (mm)	Minimum cross sectional diameter (mm)	Stress area, A_s (mm^2)	Yield strength, f_y (MPa)	UTS, F_u (Mpa)
6	5.1	20.4	560	700
8	7.1	39.6	560	700
10	9.1	65.0	560	700
12	11.1	96.8	560	700

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Design Case 1

Fire resistance duration = 30 minutes

Table 1a Characteristic values of resistance to tension loads in 20 MPa to 50 MPa concrete strength for Fire resistance duration = 30 minutes

Anchor size, d_b		M6	M8	M10	M12
Drilled hole diam, d_h (mm)		6	8	10	12
Effective depth, h (mm)	Characteristic Resistance				
44	Steel Failure - $N_{Rk,s,fi,30}$ (kN)	**0.9**			
	Pull-out failure concrete - $N_{Rk,p,fi,30}$ (kN)	1.0			
	Concrete cone failure - $N_{Rk,c,fi,30}$ (kN)	2.2			
52	Steel Failure - $N_{Rk,s,fi,30}$ (kN)		**2.4**		
	Pull-out failure concrete - $N_{Rk,p,fi,30}$ (kN)		3.0		
	Concrete cone failure - $N_{Rk,c,fi,30}$ (kN)		3.4		
68	Steel Failure - $N_{Rk,s,fi,30}$ (kN)			**4.4**	
	Pull-out failure concrete - $N_{Rk,p,fi,30}$ (kN)			4.8	
	Concrete cone failure - $N_{Rk,c,fi,30}$ (kN)			6.6	
80	Steel Failure - $N_{Rk,s,fi,30}$ (kN)				7.3
	Pull-out failure concrete - $N_{Rk,p,fi,30}$ (kN)				**6.2**
	Concrete cone failure - $N_{Rk,c,fi,30}$ (kN)				9.9

NOTE: Bold values indicate limiting load. Data in table lists all possible failure mechanism due to fire.

Table 1b Characteristic values of resistance to shear loads in 20 MPa concrete strength for Fire resistance duration = 30 minutes

Anchor size, d_b		M6	M8	M10	M12
Drilled hole diam, d_h (mm)		6	8	10	12
Edge distance, e_c (mm)	Characteristic Resistance				
88	Steel Failure without lever arm - $V^0_{Rk,s,fi,30}$ (kN)	0.9			
	Steel Failure with lever arm - $M^0_{Rk,s,fi,30}$ (N.m)	**0.7**			
	Concrete edge failure - $V^0_{Rk,c,fi,30}$ (kN)	1.7			
104	Steel Failure without lever arm - $V^0_{Rk,s,fi,30}$ (kN)		**2.4**		
	Steel Failure with lever arm - $M^0_{Rk,s,fi,30}$ (N.m)		2.4		
	Concrete edge failure - $V^0_{Rk,c,fi,30}$ (kN)		2.5		
136	Steel Failure without lever arm - $V^0_{Rk,s,fi,30}$ (kN)			4.4	
	Steel Failure with lever arm - $M^0_{Rk,s,fi,30}$ (N.m)			5.9	
	Concrete edge failure - $V^0_{Rk,c,fi,30}$ (kN)			**4.1**	
160	Steel Failure without lever arm - $V^0_{Rk,s,fi,30}$ (kN)				7.3
	Steel Failure with lever arm - $M^0_{Rk,s,fi,30}$ (N.m)				12.3
	Concrete edge failure - $V^0_{Rk,c,fi,30}$ (kN)				**5.8**

NOTE: Bold values indicate limiting load for conditions without lever arm. Data in table lists all possible failure mechanism due to fire.

Note: Concrete edge failure values are based on 20 MPa concrete strength. For values in higher concrete strengths, please multiply $V^0_{Rk,c,fi,30}$ by the concrete compressive strength effect X_{vc}, as follows;

f'_c (MPa)	20	30	40	50
X_{vc}	1	1.22	1.41	1.55

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Design Case 2

Fire resistance duration = 60 minutes

Table 2a Characteristic values of resistance to tension loads in 20 MPa to 50 MPa concrete strength for Fire resistance duration = 60 minutes

Anchor size, d_b		M6	M8	M10	M12
Drilled hole diam, d_h (mm)		6	8	10	12
Effective depth, h (mm)	Characteristic Resistance				
44	Steel Failure - $N_{Rk,s,fi,60}$(kN)	**0.8**			
	Pull-out failure concrete - $N_{Rk,p,fi,60}$ (kN)	1.0			
	Concrete cone failure - $N_{Rk,c,fi,60}$ (kN)	2.2			
52	Steel Failure - $N_{Rk,s,fi,60}$(kN)		**1.7**		
	Pull-out failure concrete - $N_{Rk,p,fi,60}$ (kN)		3.0		
	Concrete cone failure - $N_{Rk,c,fi,60}$ (kN)		3.4		
68	Steel Failure - $N_{Rk,s,fi,60}$(kN)			**3.3**	
	Pull-out failure concrete - $N_{Rk,p,fi,60}$ (kN)			4.8	
	Concrete cone failure - $N_{Rk,c,fi,60}$ (kN)			6.6	
80	Steel Failure - $N_{Rk,s,fi,60}$(kN)				**5.8**
	Pull-out failure concrete - $N_{Rk,p,fi,60}$ (kN)				6.2
	Concrete cone failure - $N_{Rk,c,fi,60}$ (kN)				9.9

NOTE: Bold values indicate limiting load. Data in table lists all possible failure mechanism due to fire.

Table 2b Characteristic values of resistance to shear loads in 20 MPa concrete strength for Fire resistance duration = 60 minutes

Anchor size, d_b		M6	M8	M10	M12
Drilled hole diam, d_h (mm)		6	8	10	12
Edge distance, e_c (mm)	Characteristic Resistance				
88	Steel Failure without lever arm - $V^0_{Rk,s,fi,60}$ (kN)	0.8			
	Steel Failure with lever arm - $M^0_{Rk,s,fi,60}$ (N.m)	**0.6**			
	Concrete edge failure - $V^0_{Rk,c,fi,60}$ (kN)	1.7			
104	Steel Failure without lever arm - $V^0_{Rk,s,fi,60}$ (kN)		**1.7**		
	Steel Failure with lever arm - $M^0_{Rk,s,fi,60}$ (N.m)		1.8		
	Concrete edge failure - $V^0_{Rk,c,fi,60}$(kN)		2.5		
136	Steel Failure without lever arm - $V^0_{Rk,s,fi,60}$ (kN)			**3.3**	
	Steel Failure with lever arm - $M^0_{Rk,s,fi,60}$ (N.m)			4.5	
	Concrete edge failure - $V^0_{Rk,c,fi,60}$(kN)			4.1	
160	Steel Failure without lever arm - $V^0_{Rk,s,fi,60}$ (kN)				**5.8**
	Steel Failure with lever arm - $M^0_{Rk,s,fi,60}$ (N.m)				9.7
	Concrete edge failure - $V^0_{Rk,c,fi,60}$(kN)				5.8

NOTE: Bold values indicate limiting load for conditions without lever arm. Data in table lists all possible failure mechanism due to fire.

Note: Concrete edge failure values are based on 20 MPa concrete strength. For values in higher concrete strengths, please multiply $V^0_{Rk,c,fi,60}$ by the concrete compressive strength effect X_{vc}, as follows;

f'_c (MPa)	20	30	40	50
X_{vc}	1	1.22	1.41	1.55

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Design Case 3

Fire resistance duration = 90 minutes

Table 3a Characteristic values of resistance to tension loads in 20 MPa to 50 MPa concrete strength for Fire resistance duration = 90 minutes

Anchor size, d_b		M6	M8	M10	M12
Drilled hole diam, d_h (mm)		6	8	10	12
Effective depth, h (mm)	Characteristic Resistance				
44	Steel Failure - $N_{Rk,s,fi,90}$ (kN)	**0.6**			
	Pull-out failure concrete - $N_{Rk,p,fi,90}$ (kN)	1.0			
	Concrete cone failure - $N_{Rk,c,fi,90}$ (kN)	2.2			
52	Steel Failure - $N_{Rk,s,fi,90}$ (kN)		**1.1**		
	Pull-out failure concrete - $N_{Rk,p,fi,90}$ (kN)		3.0		
	Concrete cone failure - $N_{Rk,c,fi,90}$ (kN)		3.4		
68	Steel Failure - $N_{Rk,s,fi,90}$ (kN)			**2.3**	
	Pull-out failure concrete - $N_{Rk,p,fi,90}$ (kN)			4.8	
	Concrete cone failure - $N_{Rk,c,fi,90}$ (kN)			6.6	
80	Steel Failure - $N_{Rk,s,fi,90}$ (kN)				**4.2**
	Pull-out failure concrete - $N_{Rk,p,fi,90}$ (kN)				6.2
	Concrete cone failure - $N_{Rk,c,fi,90}$ (kN)				9.9

NOTE: Bold values indicate limiting load. Data in table lists all possible failure mechanism due to fire.

Table 3b Characteristic values of resistance to shear loads in 20 MPa concrete strength for Fire resistance duration = 90 minutes

Anchor size, d_b		M6	M8	M10	M12
Drilled hole diam, d_h (mm)		6	8	10	12
Edge distance, e_c (mm)	Characteristic Resistance				
88	Steel Failure without lever arm - $V^0_{Rk,s,fi,90}$ (kN)	0.6			
	Steel Failure with lever arm - $M^0_{Rk,s,fi,90}$ (N.m)	**0.5**			
	Concrete edge failure - $V^0_{Rk,c,fi,90}$ (kN)	1.7			
104	Steel Failure without lever arm - $V^0_{Rk,s,fi,90}$ (kN)		**1.1**		
	Steel Failure with lever arm - $M^0_{Rk,s,fi,90}$ (N.m)		1.2		
	Concrete edge failure - $V^0_{Rk,c,fi,90}$ (kN)		2.5		
136	Steel Failure without lever arm - $V^0_{Rk,s,fi,90}$ (kN)			**2.3**	
	Steel Failure with lever arm - $M^0_{Rk,s,fi,90}$ (N.m)			3.0	
	Concrete edge failure - $V^0_{Rk,c,fi,90}$ (kN)			4.1	
160	Steel Failure without lever arm - $V^0_{Rk,s,fi,90}$ (kN)				**4.2**
	Steel Failure with lever arm - $M^0_{Rk,s,fi,90}$ (N.m)				7.0
	Concrete edge failure - $V^0_{Rk,c,fi,90}$ (kN)				5.8

NOTE: Bold values indicate limiting load for conditions without lever arm. Data in table lists all possible failure mechanism due to fire.

Note: Concrete edge failure values are based on 20 MPa concrete strength. For values in higher concrete strengths, please multiply $V^0_{Rk,c,fi,90}$ by the concrete compressive strength effect X_{vc}, as follows;

f'_c (MPa)	20	30	40	50
X_{vc}	1	1.22	1.41	1.55

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Design Case 4

Fire resistance duration = 120 minutes

Table 4a Characteristic values of resistance to tension loads in 20 MPa to 50 MPa concrete strength for Fire resistance duration = 120 minutes

Anchor size, d_b		M6	M8	M10	M12
Drilled hole diam, d_h (mm)		6	8	10	12
Effective depth, h (mm)	Characteristic Resistance				
44	Steel Failure - $N_{Rk,s,fi,120}$ (kN)	**0.4**			
	Pull-out failure concrete - $N_{Rk,p,fi,120}$ (kN)	0.8			
	Concrete cone failure - $N_{Rk,c,fi,120}$ (kN)	1.8			
52	Steel Failure - $N_{Rk,s,fi,120}$ (kN)		**0.7**		
	Pull-out failure concrete - $N_{Rk,p,fi,120}$ (kN)		2.4		
	Concrete cone failure - $N_{Rk,c,fi,120}$ (kN)		2.7		
68	Steel Failure - $N_{Rk,s,fi,120}$ (kN)			**1.7**	
	Pull-out failure concrete - $N_{Rk,p,fi,120}$ (kN)			3.9	
	Concrete cone failure - $N_{Rk,c,fi,120}$ (kN)			5.3	
80	Steel Failure - $N_{Rk,s,fi,120}$ (kN)				**3.4**
	Pull-out failure concrete - $N_{Rk,p,fi,120}$ (kN)				4.9
	Concrete cone failure - $N_{Rk,c,fi,120}$ (kN)				7.9

NOTE: Bold values indicate limiting load. Data in table lists all possible failure mechanism due to fire.

Table 4b Characteristic values of resistance to shear loads in 20 MPa concrete strength for Fire resistance duration = 120 minutes

Anchor size, d_b		M6	M8	M10	M12
Drilled hole diam, d_h (mm)		6	8	10	12
Edge distance, e_c (mm)	Characteristic Resistance				
88	Steel Failure without lever arm - $V^0_{Rk,s,fi,120}$ (kN)	0.4			
	Steel Failure with lever arm - $M^0_{Rk,s,fi,120}$ (N.m)	**0.3**			
	Concrete edge failure - $V^0_{Rk,c,fi,120}$ (kN)	1.4			
104	Steel Failure without lever arm - $V^0_{Rk,s,fi,120}$ (kN)		**0.7**		
	Steel Failure with lever arm - $M^0_{Rk,s,fi,120}$ (N.m)		0.9		
	Concrete edge failure - $V^0_{Rk,c,fi,120}$ (kN)		2.0		
136	Steel Failure without lever arm - $V^0_{Rk,s,fi,120}$ (kN)			**1.7**	
	Steel Failure with lever arm - $M^0_{Rk,s,fi,120}$ (N.m)			2.3	
	Concrete edge failure - $V^0_{Rk,c,fi,120}$ (kN)			3.3	
160	Steel Failure without lever arm - $V^0_{Rk,s,fi,120}$ (kN)				**3.4**
	Steel Failure with lever arm - $M^0_{Rk,s,fi,120}$ (N.m)				5.7
	Concrete edge failure - $V^0_{Rk,c,fi,120}$ (kN)				4.6

NOTE: Bold values indicate limiting load for conditions without lever arm. Data in table lists all possible failure mechanism due to fire.

Note: Concrete edge failure values are based on 20 MPa concrete strength. For values in higher concrete strengths, please multiply $V^0_{Rk,c,fi,120}$ by the concrete compressive strength effect X_{vc}, as follows;

f'_c (MPa)	20	30	40	50
X_{vc}	1	1.22	1.41	1.55